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Industrial Arts and Vocational Education

THE SHOP TEACHERS' PROFESSIONAL MAGAZINE

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Summer School Dates

Instructors of industrial arts and vocational education may find the following list handy in choosing the summer school which they want to attend. Write to the director of summer sessions and ask for a descriptive bulletin.

Agricultural and Mechanical College of Texas, College Station, Tex. Two sessions opening June 7 and July 19.

Bradley University, Peoria 5, Ill. Two 30-day terms. Opening dates, June 17 and July 23.

Cornell University, Ithaca, N. Y. July 6 to August 14.

Oregon State College, Corvallis, Ore. Two sessions, opening June 15 and July 23.

Oswego State Teachers College, Oswego, N. Y. Six-week session opens July 6. Two four-week shop sessions open July 6 and August 2.

Pennsylvania State College, State College, Pa. June 28 to August 7.

State Teachers College, California, Pa. Three sessions, opening June 7, June 28, and August 9.

Stout Institute, Menomonie, Wis. Six-week session opens June 21.

University of Minnesota, Minneapolis 14, Minn. Two sessions opening June 14 and July 26.

Wayne University, Detroit 1, Mich. Six-, eight-, or ten-week sessions, opening June 28.

Western Michigan College of Education, Kalamazoo, Mich. June 28 to August 6.

This Month's Cover

The cover picture chosen for the May issue of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION shows the upholstery class at the Sheboygan School of Vocational and Adult Education, Sheboygan, Wis. Herbert Bast is the instructor of this class. See his article on page 193 of this issue.

Coming Conventions

April 22–24. California Industrial Education Association, at San Jose, Calif. Secretary, Lee D. Bodkin, 131 Education Bldg., University of California, Los Angeles 24, Calif.

May 5–8. Western Arts Association, at Minneapolis, Minn. Headquarters, Radisson Hotel. Secretary, Harold W. Hunsicker, 1649 Elberon Ave., East Cleveland 12, Ohio.

May 6–8. Missouri Industrial Arts Association, at Columbia, Mo. Headquarters, University of Missouri. Secretary, W. Silvey, Senior High School, Eldon, Mo.

May 6–8. **American Industrial Arts Association,** at Washington, D. C. Headquarters, Shoreham Hotel. Secretary, D. Arthur Bricker, 216 East Ninth St., Cincinnati 2, Ohio.

May 7–8. Wisconsin Association of Vocational and Adult Education, at Green Bay, Wis. Secretary, C. D. Rejahl, 211 Commercial State Bank Bldg., Madison, Wis.

May 10–12. **American Association for Adult Education,** at Des Moines, Iowa. Headquarters, Kirkwood Hotel. Director, Glen Burch, 525 W. 120th St., New York 27, N. Y.

June 21–23. **National Graphic Arts Association,** at New York City. Headquarters, Hotel Pennsylvania. Director, Fred J. Hartman, Room 412, 719 Fifteenth St., N.W., Washington 5, D. C.

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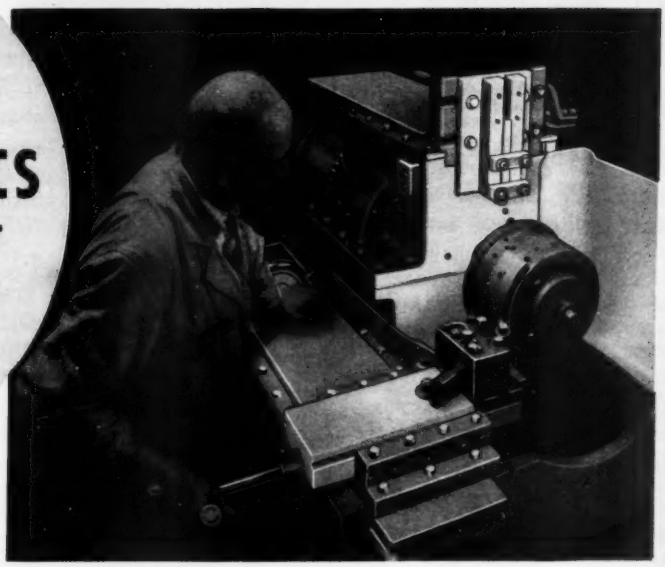

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MAY 1948

The Problem of Graduate Study in Industrial Education

ARTHUR B. MAYS
Professor of Industrial Education
University of Illinois
Urbana, Ill.

Graduate study in the universities of the United States is of relatively recent origin and much confusion exists as to its purposes, its character, and outcomes. In the older areas of study, the confusion is only slightly less than it is in the professional field of education; and industrial education shares all the uncertainty and variations of standards everywhere existing in the field of professional education. Besides, it is confronted by certain problems peculiar to industrial education. To uncover the confused and almost chaotic state of thinking with reference to graduate study, one has only to ask any group of university professors, however distinguished they may be, "What is graduate study?" The replies to that question will astonish and dismay anyone not familiar with the problems of graduate instruction. One distinguished educator of international fame recently remarked that graduate study is anything one studies after he is awarded a bachelor's degree. Others seem to think that the fifth year should merely provide the student with materials he needs in his vocation which he failed to acquire during the first four years. Most, however, indicate that the fifth year should require somewhat more initiative on the part of the student, and the materials dealt with should be to some extent more fundamental in character than is much of the undergraduate material, but they are extremely indefinite as to what is meant by "to some extent more fundamental." A review of the literature dealing with graduate work reveals an almost universal avoidance of specific definition. Few seem willing to venture a formal statement of what the character of graduate study should be as distinguished from undergraduate study. This is particularly the case concerning the first year of graduate work. There is general agreement that the second and third years should emphasize independent effort and research. So long as graduate study was pursued only by those preparing for college and university teaching, it was regarded, as in historic European practice, as a form of apprenticeship by means of which the student worked with his professor on research projects in which the professor was engaged. However, since graduate degrees are now desired by those preparing themselves for high school and elementary school, teaching, and by those preparing for work in industry, business, and numerous callings other than teaching, the numbers of students involved and the great variety of fields of study included in graduate programs have completely changed the situation.

Aims and Objectives of Graduate Study

There seem to be certain basic concepts, however, which the majority of institutions maintaining graduate programs hold. Perhaps the clearest statement of these concepts is that of Walter C. John in his investigation of graduate work in colleges and universities of the United States and reported by the United States Office of Education in 1934. In his introduction, John says his study indicates that: "The aims or objectives of graduate study in American universities may be considered from different viewpoints; but fundamental to all aims is the concept of scholarship of a high order. In the group of institutions under consideration the expressed definitions of aims range from those that relate primarily to the character and development of the student to those that are concerned with social and economic objectives. In varying degrees, stress is placed on the importance of research, subject-matter mastery, and the ability to teach.

"From the standpoint of the student, great emphasis is placed on the possession of the spirit of research or the spirit of original and independent thinking. The mastery of subject matter through the student's own initiative combined with the ability to analyze critically is everywhere stressed. The graduate student is expected to demonstrate a higher degree of scholarship than the undergraduate.

"From the broader objective we find that the university through its graduate program completes and crowns the work that is begun in the public schools: It is the extension of undergraduate work in the direction of specialization and research; it provides the student with a comprehensive view of a field of knowledge; it gives adequate preparation for those who expect to become investigators, teachers, and administrators; it trains for individual research and fosters the discovery of knowledge; it permits the student to share the investigations of the instructor by direct contact with research problems."[1]

It is evident to anyone familiar with practice among institutions offering graduate programs of study in industrial education that few of them attempt to maintain the standards of scholarship and independent study suggested by the quotation from the John investigation. It is equally clear that there is no general

[1]John, Walter C., *Graduate Study in Universities and Colleges in the United States* (Washington, D. C.: U. S. Office of Education), Bulletin No. 20, 1934.

agreement concerning the purposes or character of graduate study in industrial education. Struck's careful survey of the status of graduate work in industrial education, published by the A.V.A. in 1941,[2] shows a wide variation in entrance requirements, degree requirements, course offerings, degrees granted, and qualifications of those giving graduate instruction. The situation is specially confused at the master's degree level. The absence of anything even approaching standardization of aims or practices is probably due to three factors, namely: (1) a wide variation in requirements for the bachelor's degree in industrial education; (2) varying reasons on the part of students for undertaking graduate study; and (3) fundamental differences in the conception of the purposes and nature of graduate study on the part of graduate professors and administrators of industrial education departments.

With reference to the variation in undergraduate requirements and the related differences in entrance requirements to graduate programs, Fryklund[3] found a range of from less than 105 semester hours to 146 semester hours and over required for graduation. The subject requirements in academic, professional, and industrial subjects vary so greatly that one cannot speak of a typical undergraduate curriculum for industrial-education majors. This means that an applicant for admittance to a graduate program who submits a bachelor's degree as evidence of qualification may have an entirely different preparation both qualitatively and quantitatively from another applicant having the same bachelor's degree but from another institution. Struck found that graduate departments in reply to the question, "What should constitute the minimum professional undergraduate requirements for students wishing to major in vocational-industrial education for an advanced degree?" made suggestions for trade experience ranging from less than two to more than eight years. Suggestions for undergraduate professional training in the major field ranged from 6 semester hours to 45 semester hours. For the quality of undergraduate scholarship required for entrance on graduate study, suggestions ranged from grades of fair or 70 per cent to excellent or 90 to 100 per cent. For those majoring in industrial arts, suggestions for minimum undergraduate requirements in the field ranged from 10 semester hours to 60 semester hours. With such variations in preparation for graduate study it is not difficult to understand why there is such a wide range of offerings at the graduate level.

Motives for Taking Graduate Studies

When one considers the purposes motivating students who seek graduate degrees the situation presents a most perplexing problem to the graduate professor and the policy makers of the graduate school. One familiar with the situation easily recognizes at least the following reasons students have for attempting graduate work: (1) a genuine desire to broaden and deepen one's scholarship in and mastery of his subject field of specialization. Such a student is only occasionally found, and he is an exceedingly important person, for it is from such that the leadership of the field is most likely to be recruited in the coming years. This is often the student who, after proving his ability, is encouraged to go on to the doctorate and to become a teacher of graduate students and a productive leader in his field; (2) a desire to acquire an advanced degree in order to enjoy the greater prestige accorded those possessing such degrees. This is the student who is primarily concerned with acquiring the degree with as little inconvenience as possible to himself, but he is a stickler for getting all he can in the matter of grades and credits, with little concern about his own intellectual and professional development; (3) a master's degree is wanted in order to obtain advancement in the salary schedule in force at the high school in which he teaches. This student is interested almost wholly in the degree rather than in professional and cultural growth; and (4) at the present moment, the war veteran who decides that until he can get into the kind of position he wants, he might as well spend a year or two in college on government pay. He is, in many cases, proving to be an excellent student, and, because of his experience and maturity, he often can be led to develop a genuine desire to grow intellectually.

It may be said, however, that the motive of a graduate student for attempting graduate study is not the most important consideration. The important matter is what happens to him during the year or years he spends in the graduate school. If the work is challenging and the teacher is really qualified to conduct graduate work, it is often possible to stimulate a genuine desire to know more and to develop both in professional skill and knowledge, and in scholarship. It often happens that a student registers in a graduate department without clear-cut purposes or with purposes which may be regarded by the faculty as not entirely legitimate, but later becomes deeply interested in scholarly work, and before the end of the experience becomes a graduate student of a high order, and may later in life be most productive as a research worker and as a teacher and leader in his chosen field of endeavor. The fact that so many students have purposes other than that of a genuine desire to broaden and enrich their professional and technical knowledge and their powers of independent study undoubtedly has affected the programs of graduate work in many institutions. The effect often has been to lower the standards of scholarship maintained by the graduate department in order to meet the desires and purposes of such students. This is one of the problems which the field of industrial education faces at the graduate level throughout the country.

Character and Quality of Graduate Offerings

There are other factors of great importance affecting the character and quality of graduate offerings. One of these which gives concern to many teachers and department heads is that in nearly all of the larger institutions, graduate work is controlled wholly or in part by a graduate school that is dominated by academic and science faculties. In all such cases, it is extremely difficult for the administrative authorities of those schools to appreciate the problems facing the departments of industrial education or to see the possibilities of advanced study in this field. A few years ago, the head of a department of industrial education in one such institution requested approval of a proposed graduate course in industrial education, but the proposal was rejected by the executive committee of the graduate school on the grounds that there is no literature in the field of industrial education; therefore, such a course could not be justified at the graduate level. In that particular instance, no investigation whatever was made to find out whether or not there is any literature in the field. It is this sort of attitude and unscientific practice on the part of graduate schools that has made the development of adequate programs of advanced study in industrial education extremely difficult in some institutions.

Another aspect of this same problem is the inability of men in the scientific fields, as well as those in the academic fields, to understand what constitutes sound graduate work in the

[2]Struck, F. Theodore, chairman, Committee of the National Association of Industrial Teacher Trainers, Washington, D. C., *A.V.A. Research Bulletin No. 2*, 1941.

[3]Fryklund, Verne C., *Industrial Arts Teacher Education in the United States* (Bloomington, Ill.: McKnight & McKnight, 1941).

social sciences, such as education. It is well known to those who have engaged in research in education that the techniques which are necessary in sound investigations are probably more difficult in education than in most other fields of research. This is due, chiefly, to the fact that when engaged in research dealing with human beings, there are so many variables which cannot be controlled that in order to achieve valid results one has to use devices about which the physical scientist and the academic scholar know little or nothing. This lack of understanding on the part of men in position to interfere with the progress of graduate work in industrial education has often retarded needed developments in some of the best qualified departments in the nation.

The Functions of Advanced Study in Education

Another factor in the present situation which offers difficulties in planning adequate programs of graduate work in industrial education is the lack of agreement concerning the function of advanced study in education. This has already been referred to, but there remains to be pointed out the differences in opinion among graduate professors in industrial education itself as to the function of graduate departments. One group is very positive in the opinion that graduate work is purely professional or vocational and, therefore, all graduate courses should point toward the one end of developing skill in professional activities. The other group, while it recognizes the importance of the professional emphasis, is of the opinion that graduate work should also be scholarly in character and should develop skills in independent study and the habits of dealing fundamentally and scientifically with educational problems. These two points of view are not necessarily irreconcilable, but the fact that the difference exists has had a profound effect on the character of graduate work throughout the country. Where the first view is held exclusively, most of the courses are likely to be merely additional courses in the fields of specialization of the same general character as undergraduate courses. There is much pressure on some graduate departments to do this sort of thing. The other group insists that all of the work should be of a much more basic character than undergraduate work and should require far more independent thinking and initiative in planning and carrying out research problems, as well as the development of powers of analysis and critical thinking. These differences of opinion obtain not only at the master's degree level but as well at the doctor's level of graduate work and in many fields of study. Hollis, in his study of the status of the doctor of philosophy degree, when referring to opinions of those in the field with reference to the character of the programs of work leading to the doctor's degree said: "In spite of discordant notes, a consensus was revealed to the effect that graduate schools are now producing too many narrow specialists whose education consists in little more than the technical preparation and trade skills required for immediate adjustment to a job. Most of the individuals who sent in comments implied in one way or another that research training as currently offered seldom qualified doctoral candidates for rich personal and social living within the framework of their chosen occupations. They wished that advanced graduate work might contribute more specifically to the liberation of the student's mind in at least three ways: first, by introducing him to intellectual freedom through discipline in logical methods of thought; second, by enlarging the scope of his ideas through relating his rapidly expanding acquaintance with a specialized field to the great expanse of related human knowledge; and third, by extending his freedom in the social sphere through increasing his ability to communicate ideas to others. In other words, their plea was for the type of specialist that Nicholas Murray Butler once characterized as a 'broad man sharpened to a point.' "[4]

Fitting the Courses to the Needs of the Student

Probably the soundest approach to the problem of graduate study in industrial education would be first of all to ascertain what the intellectual and vocational needs really are of students who are capable of doing work beyond the bachelor's degree, and what the needs of the field of industrial education are with reference to its advancement and enrichment as a field of study. It is probable that when this approach is used, far more attention will be given both to the background preparation of those who are admitted to graduate study and to the enrichment of the courses offered. It would probably result in more courses designed to broaden and deepen the understanding of students with reference to the underlying principles of their work, and to courses designed to extend the boundaries of knowledge needed for the further strengthening of industrial education. It would doubtless lead to the giving of more attention to the development of scientific attitudes and techniques in solving professional problems, and to greater efforts to develop initiative and clear thinking in dealing with course making, teaching procedures, and planning. In general, such an approach would lead to placing stress upon such elements of the field as: (1) the history and fundamental theories underlying both vocational-industrial education and industrial arts; (2) the relationships which should exist between industrial education and the other phases of education in a democracy; (3) the ascertainable trends in economic, social, and political life which affect industrial education; (4) the administrative practices which seem most conducive to effective teaching and the functioning of programs of industrial education; (5) the trends in technical knowledge and industrial practices with which the teacher and administrator should be familiar; (6) the tools needed to conduct scientific studies and to understand research reports of other investigators; (7) the techniques of course construction and curriculum building fundamentally considered; and (8) the development of scholarly attitudes toward one's own field of work and that of others. Programs of this character should emphasize the practical applications of the knowledge acquired to the daily tasks of teachers and administrators, and the instructor should constantly be concerned with the kind of professional worker being developed rather than with "knowledge for its own sake." In a word, graduate programs based on the two groups of data, namely: (1) the ascertained intellectual and professional needs of the students, and (2) the needs of the field of industrial education for new content, organization, and advancement, would probably result in live, functioning programs of graduate study that could meet any valid test for advanced study of a high order.

It seems clear that the *quality* of work pursued at the graduate level is far more important than the *quantity* of work that one completes. This cannot be too strongly emphasized. Much would be gained if less attention were given to counting units or semester hours and more given to work of high quality. Industrial education is very much in need not only of far more research than has been undertaken in recent years, but of research of a much more fundamental and scholarly character than is usually found in lists of research reports. Increasing numbers of young men are coming into the colleges and uni-

[4] Hollis, Ernest V., *Toward Improving Ph.D. Programs* (Washington, D. C.: American Council on Education, 1945), pp. 188–189.

versities with doctor's degrees from institutions which maintain high standards of scholarship, and one may expect that much greater attention will be given to basic research in the future than it receives at the present time.

Graduate Credit for Undergraduate Work

In line with these considerations, the problem which has often vexed professors and administrators of graduate departments in industrial education is that of the frequent demand for shop courses for which graduate credit is to be given. Struck found in his study that it was the opinion of most professors of graduate work that in no case should shopwork be given graduate credit unless it is of a highly technical character and goes far beyond anything offered in the undergraduate schools with reference to technical knowledge, mechanical competency, and ability to carry on research in shop processes. This is undoubtedly a sound point of view, and the old pressures for credit for undergraduate types of work at the graduate level will be removed when such a view is universally accepted and when the undergraduate programs are made more effective. It is the writer's opinion that teachers who are defective in elementary shop processes should be willing to take the shop courses they need without credit, and thus to protect the meaning and prestige of the graduate degrees they expect to obtain by not insisting on receiving graduate credit for undergraduate work. If it should become common practice to give types of work at the graduate level which are no different in quality or character from those at the undergraduate level, it seems clear that the master's degree would soon lose all meaning, and there would be no particular advantage in one's possessing that degree. If, on the other hand, high standards are maintained for the master's and doctor's degrees in industrial education, those degrees will continue to carry the prestige and value which they traditionally have possessed.

It is quite clear that the whole problem not only of present practices in graduate work, but of what graduate work in industrial education *should* be, needs very careful study. It would be most helpful to those interested in such problems if all industrial-education teachers in higher institutions would give greater consideration to this question than it has received in the past. A distinguished professor in the field of secondary education recently said to the writer: "It is impossible to separate the problem of improving graduate study from the problem of the improvement of undergraduate study." If graduate work is to be placed on the level which it ought to occupy in the educational scheme, it will be necessary first to start with improvements at the undergraduate level. It is to be hoped that the leadership in industrial education in the near future will become deeply concerned with the problem of the reorganization of the whole area of the professional education of teachers of industrial education, beginning with the freshman year in college and running through to the doctor's degree. The time is ripe for a restudy of this whole problem, and there is much in the present situation to encourage an optimistic view of the possibilities for significant improvement in the years immediately ahead.

Peace Is Our Chief Business

THOMAS A. HIPPAKA
Professor of Industrial Education
Iowa State College
Ames, Iowa

The atomic destruction of Hiroshima brought us two choices. If we persist in our indifference and our blundering long enough, the Frankenstein which we have created will destroy us. On the other hand, humanity could advance a thousand years through the constructive use of fission power. Either we blow up together or grow up together; such are the two alternatives now faced by a world, war weary and bewildered.

What are our chances for living if we do not overcome our present apathy? Should war come, which God forbid, forty million of our people could be killed in the first 24 hours, by bombs capable of generating heat six thousand times the surface heat of the sun. More than 40 per cent of the people in the United States live in 140 cities of 100,000 population or more, ideal for destruction by atomic bombs.

Nor should we overlook the possibilities of biological warfare, hideous in all of its potentialities for the destruction of human life.

For the first time in this world, we face mass death. Up to this time, death has been an individual occurrence to a very considerable extent. The threat of atomic and biological destruction has changed all this. While medical science has extended the span of human life to a most remarkable degree, these developments have gone for naught, if we fail to win the peace. In fact, the life span of infants born today can very well depend upon whether or not we learn to live together, as becomes Christians.

Peace, therefore, has become our chief business.

The Issue

"We should not live in a fool's paradise. Atom bombs are now being produced in sufficient quantities to destroy all the cities of the world." — *Dr. Harold C. Urey, Union Theatre, University of Wisconsin, September 11, 1947.*

Such is the grave and timely declaration of a world-renowned scientist, who is well qualified to admonish us. No one knows better than Dr. Urey the destructive powers of the diabolical Frankenstein which he helped create. Little did he realize that two years after the creation of this powerful instrument, the world would still be without adequate controls over the atomic bomb.

Do we have to be frightened into a Christian way of living, or will we make the Sermon on the Mount our international law, because we choose to be intelligent people who possess sufficient character to create a peaceful world? The latter is the only alternative, and the answer is that we must, because we can.

America has never lost a shooting war in the sense that wars are considered lost. However, nobody wins such a war, for shooting wars ultimately lead to world bankruptcy.

Today we are fighting a cold war, a war idealistic and economic in character.

Understanding, intelligence, tolerance, trust, and mutual helpfulness constitute the cure for this malady, a prescription for world peace. In the words of Raymond B. Fosdick:

"The fundamental issue of our time is whether we can develop understanding and wisdom reliable enough to serve as a chart in working out the problems of human relations, or whether we shall allow our present lopsided progress to develop to a point that capsizes our civilization in a catastrophe of immeasurable proportions."

Isolation No Longer Possible

Distance no longer isolates nations. We have created a world of machines undreamed of in human history. Today, we have jet-propelled planes traveling with the speed of sound. Only recently an American plane made the two-way flight to England without a human hand touching the controls. It is predicted that rocket ships will travel with fantastic speed of two thousand miles an hour in the not too distant future.

Such technological developments, while they add to our power as a nation, also add to our responsibilities as a people. It is obvious that the airplane can be a great instrument of peace, as well as of war. Here again, the choice is ours to make. Mass travel is rapidly becoming a reality. Language instruction must be accelerated in our schools as an imperative tool for better understanding. Any superiority complex which we Americans have must be totally eliminated if we are to make our full contribution to world understanding. In the words of John H. Furbay, director of Air World Education for Trans-World Airline:

"The problem is how to neutralize the attitudes of intolerance and prejudice and create travelers who will not offend the neighbors who have been brought so close by the air-age."

For too long a time we have expected the other fellow to come to us and to talk our language in more ways than one. It is about time that we began to reverse the procedure for our own good.

What Can the Individual Do?

Although it may appear insignificant and even infinitesimal, each of us can and must make our influence felt in local, state, national, and international affairs. When a sufficient number of people insist on peace, the world will have it. The human being does count in the world of human relationships, just as the atom has assumed tremendous importance in the physical world. While fission power has seriously added to the bewilderment of this world, we can take new hope from the atom. Just as the atom plays its important part in a chain reaction which culminates in a tremendously destructive atomic explosion, so can individuals become a vital part of a human chain reaction which terminates in the crystallizing of public opinion through co-operative effort. William Allen White has very appropriately magnified the importance of each and every one of us in these words:

"The world is made better by every man improving his own conduct — no reform is accomplished wholesale."

Public opinion is our most powerful weapon. When adequately formed and properly applied, it will literally move anything. Public opinion is made up of private opinion. Sound private opinion stems from truth. Armed with the truth, and educated to think on the basis of truth, our private opinion is bound to be sound. However, even sound private opinion is of very little value until it becomes aroused public opinion. Once released it will move mountains; it will have the explosiveness of an atomic bomb; it can be an irresistible force in our drive for peace.

The United Nations Organization

Our United Nations Organization constitutes the hope of the world in the attainment of a world government. Its imperfections are many, for it is a young organization. Success will depend entirely upon the faith, vigor, and integrity of the participating nations which, in turn, depend upon the faith, good will, and character of their people. Trygve Lie has stated well the case of the United Nations Organization in these words:

"The United Nations is no stronger than the collective will of the nations that support it. Of itself it can do nothing . . . it can be used and developed in the light of its activities and experience to the untold benefit of mankind or it can be discarded and broken."

All of us need to exercise utmost patience with the new organization. Its problems of organization and procedure are literally appalling. It is our organization, struggling desperately to get under way in a world where hate, fear, suspicion, and greed still persist. It deserves our constructive criticism and everlasting support.

There must be a United Nations Organization if there is to be a world government. Surely right thinking people cannot continue to question the motives of an organization which has in its charter such aspirations as these:

> ***"We the people of the United Nations determined***
>
> **to save succeeding generations from the scourge of war, which twice in our lifetime has brought untold sorrow to mankind and**
>
> **to reaffirm faith in fundamental human rights, in the dignity and worth of the human person, in the equal rights of men and women and of nations large and small, and to establish conditions under which justice and respect for the obligations arising from treaties and other sources of international law can be maintained, and to promote social progress and better standards of life in larger freedom,**
>
> ***And for these ends***
>
> **to practice tolerance and live together in peace with one another as good neighbors, and**
>
> **to unite our strength to maintain international peace and security, and to ensure, by the acceptance of principles and the institution of methods, that armed force shall not be used, save in common interest, and to employ international machinery for the promotion of the economic and social advancement of all peoples,**
>
> ***Have resolved to combine our Efforts to accomplish these aims.***
>
> **Accordingly, our respective Governments, through representation assembled in the city of San Francisco, who have exhibited their full powers found to be in good and due form, have agreed to the present Charter of the United Nations and do hereby establish an international organization to be known as the United Nations."**

In the United Nations we have an organization which insists that arbitration will take the place of war, and that justice

will be meted out according to International Law.

World government is the only defense against the atomic bomb.

UNESCO

"Since wars begin in the minds of men, it is in the minds of men that the defenses of peace must be constructed." — *UNESCO Constitution.*

The United Nations Educational, Scientific, and Cultural Organization is a specialized agency of the United Nations Organization conceived to improve the welfare of all mankind. Offhand, its purposes and aspirations may sound ideological, but even in a world like ours the intangibles have a way of becoming the tangibles. UNESCO hopes to free men's minds; to stimulate the free exchange of ideas, thereby breaking down barriers between countries. It holds that free information should be available through a free press and a system of free radio stations. Of course, freedom is always accompanied by a deep and abiding sense of responsibility. It aims to popularize science; to make known to masses of mankind scientific principles and discoveries, together with the ensuing social implications. The United Nations Educational, Scientific, and Cultural Organization promotes the exchange of specialists and students throughout the world, making known to people everywhere basic discoveries in health, food, general living, as well as the current and good practices in education. It aims to become the voice of the people; to develop true international spirit and not power politics; to translate the classics of one country into the language of another in order to create understanding and good will. The basis of UNESCO rests in faith; confidence in ideals and respect for a free conscience; peace retained as though it were a legacy. It is the common solvent of the aspirations of mankind; in fact, it should become the very conscience of mankind.

Work

"The world has no place to turn today for regeneration except the United States. But if we are to accept the challenge to save civilization, it means greater effort than that exerted during the war. There are no adequate substitutes for hard work and full production. If we are to win the peace, as we helped to win the war, we must do it by showing the real might of America — by justice, by helpfulness which insists upon self help, and finally by production and still more production. Only in this way can we reduce the cost of living and build up our reserves — physical, financial, and spiritual." — *Bernard M. Baruch.*

Work can very well be a cure to many of the ills of the world today. Here in our own land we still have natural resources; we have research and we win our share of the world honors in this area; we have the brains; we have the technology; we have the man power; we have the tools; and we have the motivators for work. However, this is not so in other lands. In many countries the monetary system has been wrecked; money has no value. Such is the case, especially in Germany, where the cigarette has become an important medium of exchange. There is no money with value, and consequently, even if there were commodities to buy, one would not have the wherewithal with which to buy them. England is short of dollars. Even Sweden is concerned about her kroner, while our dollar is much sought after. Food and clothing are scarce. A man cannot dig coal or farm on 1200 calories. Food and wages are terrific motivators of work; without such incentives men cannot and will not work. European and Asiatic countries need council, the know-how, tools, food, building materials, fertilizers, clothing, and shelter, in order to go to work. Through work they will create goods, wages, and monetary systems. Through work and reasonable sacrifice, we too can assist these people to re-establish their industries so that they can eventually help themselves.

Work in America is quite a different matter from work in Europe or Asia. Wages have reached a new high, and our monetary system is healthy. Sixty million people have jobs, and their standards of living are the best in the world. During World War II, our production astounded the world, and we know now that without it, the war could not have been won. America must continue to produce if we are to win the peace; our economy needs to be geared up accordingly. Even in a land of plenty such as ours we need to remember that:

1. No group or individual has a right to paralyze the country.
2. Wealth is created through work which results in the production of goods.
3. No people can expect to secure more and more for less and less — more wages for less work.
4. Increased wages stem from greater production.
5. Labor, industry, the consumer, and the government are all partners in the production of goods.
6. A premium should always be placed upon individual initiative, industry, courage, capital, and resourcefulness.
7. Labor, industry, government, and the consumer have all made some errors. They have been right, too; right oftener than they have been wrong.
8. Human relationships conducive to peace and production should forever be our goal.
9. Our government's responsibility is to establish the rules of the game by passing needed legislation, and to furnish competent officials to umpire the game of production, when labor and industry find themselves in disagreement.
10. The employer has a moral responsibility not to let the worker down, and the worker is obligated not to produce chaos by the withdrawal of labor power whenever he takes a notion to do so.

Education

"Education has now become the chief problem of the world, its one holy cause. The nations that see this will survive, and those that fail to do so will slowly perish. . . . There must be re-education of the will and of the heart as well as of the intellect, and the ideals of service must supplant those of selfishness and greed." — *G. Stanley Hall.*

Whether we have any world at all will depend on who wins the race, education or catastrophe. In 1914, castastrophe was out in front. Castastrophe won again in 1939. Education having lost the race on these two occasions cost this world 120 million casualties and 3 trillion, 337 billion dollars. Millions of people were left homeless to face starvation and disease. Surely these colossal losses should convince us for all times that education constitutes the surest road to human understanding, without which peace cannot be attained.

As a nation, our ability to pay for the worth-while values in life has reached an unprecedented level. Our yearly national income has risen to the astounding figure of 225 billion dollars. Of this amount, we are spending no more than 3 billion for education. While we promote our democratic way of life with one and one-half per cent of our income, Russia spends 8 per cent of her income on her particular kind of ideology. With the world hanging on the brink of disaster, we, a world power, spend 20 billion on liquor, tobacco, recreation, and cosmetics. We would do well to look to our sense of values if we are to assume our world responsibilities, as becomes a great nation.

Education has become the very lifeblood of the world. Without it there will be no world at all. We have tried both war and appeasement; it is about time that we gave education a real trial.

In the words of Dr. Frank D. Fackenthal, acting president, Columbia University:

"Education with its broad sweep of accumulating thought and accomplishment must and will raise men's standards of conduct, brush aside the hallucinations of aggressive war, increase regard for the rights of others and so clear the way for the ever higher life of generations to come."

Accepting Our Stewardship

The Almighty has richly blessed us with natural resources here in America. Minerals, forest, soil, oil, animal and vegetable life have been ours beyond human imagination. These resources God entrusted to us to use wisely and sparingly. We have sinned beyond forgiveness, as we have squandered our vast God-given riches.

Let us briefly consider a few items of wanton waste. It is estimated that we squander as much as 25 per cent of our food. One third of our top soil is gone, and that alone is extremely serious in a country as young as ours. We have scandalously dissipated forests, minerals, and oil. The United States Department of Agriculture estimates that rats will destroy 124,470,000 bushels of our 1947 grain crop, which will exceed 3 billion bushels.

Too often we have not only been careless with our natural resources, but we have taken the erroneous and damaging point of view, that regardless of how we abuse our natural resources, they will last during our time on this earth; that future generations can worry about them after we are gone.

Various factors over which we have considerable control complicate the food situation. Today we are eating 17 per cent more food than we consumed before the war. While it is true that our population has increased 10 per cent, many of us would be better off if we were willing to pull up our belts a bit. Beerless days as well as meatless days would help. Less grain fed to livestock would feed a very considerable number of starving people in other lands. Unfortunately, there is speculation in the food picture, which only adds to the gravity of the situation.

Minerals, forests, soil, oil, and food were mighty factors in winning World War II. They constitute powerful assets in winning the peace. If we were to eliminate waste in this country, we could feed many millions of starving people in this world.

General Marshall's speech at Harvard University caught the attention of peoples everywhere. Hailed as the Marshall Plan it holds high hopes for the starving of Europe and Asia. It suggests an inventory of the needs of certain nations in distress, as well as an estimate of the ability of America to help. Public opinion surveys indicate that the proposal is gaining acceptance and support. Help to Europe and Asia constitutes both a military and political requisite, as well as a humanitarian and an economic expedient. The plan is very sane, in that it prescribes our help to supplement the self-help of those to be assisted, in order that they may proceed on their own power in the shortest possible time. It conforms to the policy well stated by Senator Vandenberg in these words: "We can't underwrite the peace of the world forever." The best assistance is always the kind that helps people to help themselves.

To render assistance to European and Asiatic countries to the best of our ability is not only our Christian duty, but it is also good business. Our economy is inextricably interwoven with theirs. While it is true that we have already assisted European nations to the amount of twenty billion dollars since the shooting war ceased, the world has faced a most crucial winter in 1947–48. England, France, and even parts of Germany would be emerging from want and chaos if droughts and a winter, one of the worst in the history of Europe, had not struck with such paralyzing severity in 1947. France has planted her wheat twice in 1947, Germany has lost her potato crop, a serious blow when we consider that 83 per cent of her diet is made of bread and potatoes. Europe and Asia still lie disorganized and devastated in abject poverty, ready prey for convulsive revolution. The people of these continents look to America for help. They still have faith in us, and we need to remember that ruined hopes are even worse than ruined buildings.

American Democracy Must Be Made a Living Example of Successful Government in the Eyes of the Rest of the World

If there ever was a time in human history when democracy must remain a sustaining force for all that is good in this world, that time is now. Democracy must become a cause to which we dedicate our lives with even greater universality. We want the kind of democracy that rewards honest work with continued employment, food, clothing, housing, and security. Here we can go as far as our will and skill permits, providing we do not interfere with the rights of others to do likewise. We enjoy freedom of speech, press, radio, religion, and assembly; to think and to dare as becomes free men. And for all of these privileges we must be willing to pay a price.

The price which we pay for freedom in a democracy is well within the reach of all of us. There needs to be a constant rebirth of self-discipline, self-sacrifice, and an abiding sense of responsibility. Justice, equality, and tolerance constitute worthy goals. We must not cheat, for we are only shortchanging ourselves. Homage to men and women who place service above self must take preference over the worship of the dollar.

Democracy is postulated on good citizenship. Citizenship in a democracy does not mean that the state engulfs the individual, nor does it mean that the individual occupies himself exclusively with his private affairs with no thought given to public matters. The terrifying truth is that if we do not adequately assume our citizenship responsibilities, democracy will forsake us. We will no longer enjoy privacy as citizens, in fact, we will not even go about the all-important business of making a living as free men.

There are certain significant meanings which belong to democracy, and democracy alone. They are concepts which must become fundamentals in our thinking and our actions. Let us examine some of them:

1. The individual counts in a democracy. However, no one is an island unto himself; every individual is a part of the mainland.

2. Democracy cannot be divorced from politics. As long as our citizenry views politics as a dirty business for dishonest, self-seeking promoters, politics will remain just that. Politics needs to become the business of people with intelligence, courage, integrity, and toughness to battle against all odds, legitimate or questionable.

3. Apathy and indifference have no place in a democracy.

4. Democracy is founded upon freedom accompanied by a strong sense of responsibility. Every right has a corresponding duty.

5. Minorities are respected although majority rule constitutes the ultimate. However, we need to recognize with Dr. Frank D. Fackenthal that: "Self-centered minorities can and have destroyed nations. A minority which uses its balance of power to compel special legislation that endangers the welfare of all; a minority which hesitates not to starve a city; in minority, even of 200 million, which prevents the making of peace in the world must accept accountability not only to itself, but to society in general, for the power which it wields."

6. Democracy is a constantly evolving form of government. It is never quite complete. Therefore, it is not a lazy man's way of life; it is not an easy way of life. Each generation must first catch up with it, and in a lifetime carry it forward where the torch may be picked up by those who are yet unborn.

7. In a democracy, we the people are the government. The more effectively we assume our responsibilities as citizens, the less government there will have to be. When we criticize our government, we are really finding fault with ourselves. Whenever we spend the government's money, it is our money that we are spending.

8. Democracy means the fellowship of free men leading to a world brotherhood.

9. Democracy is a Christian way of life, where we do what we ought, voluntarily.

10. Democracy means homes, schools, jobs, equal opportunity for all, "government of the people, by the people, and for the people," understanding, tolerance, a stable economy, and security for people who are not only successful in their personal affairs, but who devote ample time to public affairs.

11. Democracy means a people strong; physically, mentally, morally, spiritually, economically, technologically, scientifically, and militarily, the latter until the Christian way of life has been established on the face of this earth.

What of the Future?

One would be very unwise to assume the role of a prophet. We know that it is a dangerous world, but it is also a world of great opportunity for those who would improve the lot of mankind.

Faith was made for days like these; faith in ourselves; faith in the common man, fortified by truth and blessed with educational opportunity; faith in America; faith that the good will ultimately prevail; and above all, faith in Almighty God.

In our own country depressions can be avoided. If labor, industry, government, and the consumer become real Christian partners in a common enterprise, which we call our democracy, our economy need not fail.

If democracy fails, and it must not fail, it will be because of our indifference; because termites have been allowed to bore from the inside, out.

War is not inevitable. It can, and must be avoided. America needs to be fair, but firm, ever endeavoring to understand others.

We must remain strong, not only economically and militarily, but morally and spiritually as well. This is well expressed in the words of Dr. Charles Prosser: "The twentieth century looms before us, big with the fate of many nations. If we stand idly by, if we seek merely swollen, slothful ease and ignoble peace, if we shrink from the hard contests where men must win at hazard of their lives and at the risk of all they hold dear, then the bolder and stronger peoples will pass us by and will win for themselves the domination of the world. Let us therefore boldly face the life of strife, resolute to uphold righteousness by deed and by word; resolute to be both honest and brave; to serve high ideals, yet to use practical methods. Above all, let us shrink from no strife, moral or physical, within or without the nation, provided we are certain that the strife is justified; for it is only through strife, through hard and dangerous endeavor, that we shall ultimately win the goal of true national greatness."

Course Outline for Related Subjects in Carpentry

CARLTON DWIGHT
Principal, Vocational School
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(Continued from page 112 of the March, 1948, issue)

3. Precautions in using and exposing sharp edge tools
4. Accidents caused by loose protruding nails

H. Test and review

Course: Construction of Scaffolding and Staging

Construction of Scaffolding and Staging

A. Trade science
   1. Lumber manufacture—plain-sawed lumber, quarter-sawed lumber
   2. Lumber classification and grading
      a) Classification of lumber
      b) Basis of grading rules
      c) Four classes of lumber
      d) Hardwood lumber grades
      e) Softwood grade
      f) Yard lumber
      g) Structural timber
      h) Lumber defects
   3. Seasoning of wood
      a) Moisture content of green wood
      b) Time required for drying
      c) Air drying
      d) Shrinkage by air drying
      e) Kiln drying — reasons for, fundamental factors in kiln drying, case hardening, honey combing, kiln drying, air dried stock, steaming lumber, moisture content of kiln dried lumber, chemical changes of wood
   4. Shrinkage and swelling of wood
      a) Causes of shrinkage
      b) Amount of shrinkage
      c) Average shrinkage of common woods
      d) Amount of swelling of wood
      e) Advantages of quarter-sawed wood
      f) Checks and shakes
      g) Checking of wood in seasoning
      h) Changing of shape by shrinkage
   5. Sizes of lumber
      a) Standardization of sizes
      b) Standard lumber terms for stock of various sizes
      c) Abbreviations and lumber terms
   6. Definitions and purposes of scaffolding and staging materials. Kinds and grades of lumber used for scaffolding and staging.
   7. Rope — materials used, strength and safety factors, waterproofing, storage, effects of acids, alkalies, and other chemicals on rope
   8. Principles of pulleys

B. Trade mathematics
   1. Trade method of figuring amount and sizes of materials and labor for scaffolding
   2. Trade method of figuring amount and sizes of materials and labor for staging jobs
   3. Problems in the solution of various angles required in the construction of sawhorses

C. Trade processes — description of and construction of:
   1. Independent pole scaffolds
   2. Scaffolding around inside and outside corners of buildings
   3. Horse scaffolds
   4. Cantilever or out-rigger scaffolds
   5. Temporary ladders
   6. Runways and staging
   7. Methods of rigging
   8. Methods of splicing rope

D. Trade information
   1. Building laws regarding scaffolds, guard rails, footboards, etc.

E. Special tools, equipment, and materials
   1. Stock sizes of lumber used for scaffolding and staging
   2. Block and tackle
   3. Scaffold hooks

F. Blueprint reading and sketching
   1. Making *on the job* sketches of various types and methods of scaffolding and rigging

G. Safety and accident prevention
   1. First aid in cases of severe bleeding
   2. Precautions to be observed in building

or using any type of scaffolding and staging
3. Importance of straight grain in lumber that is used for scaffold planks
4. The value of safety feet on ladders
5. Methods of using ladders to prevent accidents
6. Proper handling of heavy timbers
7. Accidents caused by loose protruding nails
8. Placing tools and material where they will not fall and injure fellow workmen
9. Keeping ladders in good condition
10. Fastening upper ends of ladders
11. Chain hoists and dangers involved in their use

H. Test and review

Course: Framing, Sheathing and Insulation

Sill, Girder, and Floor Framing

A. Trade science
1. Warping of wood — causes, how to lessen shrinkage and warping, coating ends to prevent checking
2. Durability of wood
   a) Life of untreated wood placed subject to decay
   b) Conditions which cause variation of durability
3. Decay of wood — fungi and decay, kind of decay, prevention of sapwood stains (blue stains), wood preservation methods
4. Kinds and grades of lumber used for framing sills, girders, and floors
   a) Kinds of lumber used
   b) Manufacture of framing lumber
   c) Defects in framing lumber
5. Description of types of frame construction and terms used
6. Shapes, sizes, and weights of structural steel used in building construction

B. Trade mathematics
1. Use of measuring and layout tools for framing sills, girders, and floors
2. Estimating floor loads
3. Size of floor girders and joist and columns to carry required load
4. Estimating amount of lumber in floor joists and bridging
5. Estimating amount of lumber in flooring
   a) Allowances for matching and waste
6. Estimating quantity and sizes of nails required
7. Estimating amount of labor in framing sills, girders, and floors

C. Trade information
1. Building laws regarding framing sills, girders, and floors
2. Use of builder's handbooks

D. Special tools, equipment, and materials
1. Stock sizes of lumber used for framing sills, girders, and floors

E. Trade processes — description of and construction of:
1. Sills
2. Girders
3. Columns
4. Floor joists and bridging
5. Openings in floors
6. Subfloors

F. Blueprint reading and sketching
1. Building construction prints
   a) The language of industry
      1) Lines, signs, and symbols
      2) Visualization
   b) Lines, signs, and symbols
   c) Essentials of shape description
   d) Essentials of size description
   e) Sections
2. Problems in reading information on prints concerning framing, sills, girders, and floors
   a) Determining type of construction
   b) Taking off dimensions and materials
3. Making *on the job* sketches of various types and methods of framing sills, girders, and flooring

G. Safety and accident prevention
1. Safety rules in the use of tools
2. Proper handling of heavy timbers
3. Proper piling of lumber to prevent falling over
4. First aid in cases of sunstroke, fainting, etc.

H. Test and review

Side Wall and Sheathing

A. Trade science
1. Kinds and grades of lumber and other materials used for side walls and sheathing
   a) Kinds of lumber used — characteristics
   b) Manufacture of plywood and veneers
   c) Manufacture of Celotex and other lumber products
2. Description of types of frame construction and terms applied to side wall construction and sheathing

B. Trade mathematics
1. Use of measuring and layout tools for side wall construction and sheathing
2. Problems in square area
3. Estimating the studding required — set 16 inches on center
   a) Allowances for corners, windows, and door openings
4. Estimating the amount of sheathing required
   a) Allowances for matching and waste
5. Estimating quantity of nails required
6. Estimating hours of labor in erection, of side wall frames and sheathing

C. Trade information
1. Building laws regarding side wall construction and sheathing
2. Use of builder's handbooks

D. Special tools, equipment, and materials
1. Stock sizes of lumber used for side wall construction and sheathing

E. Trade processes
1. Description of and construction of:
   a) Balloon frames — outside wall openings in the balloon frame
   b) Platform and modern braced frame
2. Methods of applying sheathing

F. Blueprint reading and sketching
1. Essentials
2. Problems in reading information on prints concerning side wall construction and sheathing
   a) Determining type of construction
   b) Taking off dimensions and materials
3. Making *on the job* sketches of various types and methods of side wall and sheathing construction

G. Safety and accident prevention
1. Safety rules in the use of tools
2. Causes of infection and its prevention

Roof Framing

A. Trade science
1. Kinds and grades of lumber used for roof framing
2. Principles on which a system of roof framing can be developed; proper pitches of roofs; spacing of rafters
3. Description of common types of roofs

B. Trade mathematics
1. Estimating roof loads
2. Estimating size of rafters to carry roof loads
3. Essentials of trigonometry that apply to roof framing
4. Use of measuring and layout tools for roof framing
   a) Use of the steel square for laying out rafters
5. Trade method of figuring amount of materials and labor

C. Trade information
1. Building codes regarding roof framing
2. Use of builder's handbooks

D. Special tools, equipment, and materials
1. Stock sizes of lumber used for roof framing

E. Trade processes
1. Methods of laying out a common rafter
2. Construction of a gable roof
3. Methods of laying out hip and valley rafters
4. Construction of hip or valley roof
5. Methods of laying out and constructing dormers and roof openings
6. Methods of laying out and constructing intersecting roofs of unequal pitch
7. Special problems in laying out and constructing roofs
   a) Odd pitch rafter
   b) Snub gable
   c) Dormers built on roof sheathing

F. Blueprint reading and sketching
1. Essentials
2. Problems in reading roof framing prints
   a) Determining type of construction
   b) Taking off dimensions and materials
3. Making *on the job* sketches of roof framing problems

G. Safety and accident prevention
1. Safety precautions to observe while working on roofs
2. Safety rules in the erection of scaffolding and staging
3. Compensation insurance

Special Framing Problems

A. Trade science
1. Kinds and grades of lumber and materials used for special framing
2. Description of special framing problems and terms used
   a) Framing of porches and protected entrances
   b) Framing of bay windows

c) Interior partition — load bearing, nonload bearing
d) Stairway framing — types and principles of stairway construction
e) Framing for fireplace hearths
f) Framing for bathroom floors

3. The prevention of decay in porch framing

B. Trade mathematics
1. Essentials of trigonometry that apply to framing
2. Use of measuring and layout tools for framing
a) Use of the steel square for layout work
3. Trade method of figuring amount of materials and labor

C. Trade information
1. Building codes
2. Use of builder's handbooks

D. Special tools, equipment, and materials
1. Stock sizes of lumber used for special framing

E. Trade processes
1. Methods of framing for porches
a) Sills, girders, joists
b) Rough columns
c) Truss over span between columns
d) Roofs
2. Methods of laying porch flooring
3. Methods of framing bay windows
4. Methods of framing partitions
a) Load bearing
b) Nonload bearing
5. Methods of stairway construction
a) Platform
b) Bridgework
c) Carriages
6. Methods of framing fireplace hearths
7. Methods of framing bathroom floors

F. Blueprint reading and sketching
1. Essentials
2. Problems in reading plans and details of special framing problems
a) Determining type of construction
b) Taking off dimensions and materials
3. Making *on the job* sketches in relation to special framing

G. Safety and accident prevention
1. Safety rules in the use of tools and materials

House Insulation

A. Trade science
1. Insulating materials — purposes, kinds and description
a) Mineral
1) Description and examples
2) Forms — loose, blanket, batt
b) Vegetable
1) Description and examples
2) Forms — blanket, batt
c) Metallic
1) Description and examples
2) Form — sheets

B. Trade mathematics
1. Estimating amounts of insulation required for a specific job
2. Trade method of figuring amount of materials and labor

C. Trade information
1. Building codes

D. Special tools, equipment, and materials
1. Stock sizes of insulating materials
2. Blower equipment for insulating materials
3. Tin snips
4. Nose and mouth mask

E. Trade processes
1. Methods of installing insulation—loose, blanket, batt, rigid

F. Blueprint reading and sketching
1. Reading plans and details of prints requiring insulation

G. Safety and accident prevention
1. Danger of inhaling particles of loose insulating material
2. Dangers of inhaling particles of blanket and batt types of insulating material
3. Safety precautions to be observed when working with insulating materials

Course: Exterior Finishing

Roofing

A. Trade science
1. Description of purposes and characteristics of roofing materials
a) Shingle lath or roof boards
b) Wood shingles—lumber used, grades, characteristics
c) Roll roofing material
d) Strip and individual composition shingles
e) Rigid asbestos shingles
f) Canvas roll roofing
g) shingle nails
h) Metal flashings
2. Selection of roofing materials
3. Purpose of air spaces in sheathing for wood shingles
4. Frost and its effect on nails used in asphalt roofing paper

B. Trade mathematics
1. Estimating the quantity of materials
a) Area of roof surfaces
b) Wood shingles
c) Roof boards
d) Shingle nails and flashing
e) Composition roof coverings
2. The use of layout and measuring tools in applying roofing
3. Trade method of figuring amount of materials and labor

C. Trade information
1. Building codes
2. Use of builder's handbooks

D. Special tools, equipment, and materials
1. Stock sizes of roofing materials

E. Trade processes
1. Methods of laying roof boards
2. Methods of applying the starting course of shingles
3. Methods of laying out and aligning courses
4. How to flash and shingle a hip and valley roof
5. Methods of applying roll roofing
6. Methods of applying strip and individual composition shingles
7. Methods of applying rigid asbestos shingles
8. Methods of applying canvas roofing

F. Blueprint reading and sketching
1. Essentials
2. Reading plans and details of roof construction
3. Making *on the job* sketches of roofing problems

G. Safety and accident prevention
1. Safety precautions to observe while working on roofs

Exterior Trim

A. Trade science
1. Cornices
a) Definition and function
b) Common types
c) Definition and purpose of wood members of cornices
d) Lumber used in cornice construction
2. Window frames
a) Types and standard sizes
b) Definition and purposes of terms
c) Functions
d) Materials used
e) Flashing
f) Prefabricated frames
1) Advantages
2) Standard sizes
3) Materials used
3. Door frames
a) Types—single, side light and transom
b) Definition and purpose of terms
c) Flashing
d) Standard sizes
e) Materials used
4. Types and materials used
a) Water tables
b) Corner boards
c) Belt courses
5. Porches
a) Types
b) Definition of terms
1) Floors, columns, roofs, cornices, and decks
2) Steps and balustrades
c) Materials used
6. Front entrances
a) Types — canopy, recessed
b) Definition of terms
c) Materials used

B. Trade mathematics
1. Estimating the quantity of materials needed for exterior trim
2. The use of measuring and layout tools
3. Trade method of figuring amount of materials and labor

C. Trade information
1. Building codes
2. Use of builder's handbooks

D. Special tools, equipment, and materials
1. Stock sizes of materials used
2. Standard sizes of prefabricated materials used

E. Trade processes
1. Methods of cornice construction
a) How to build common types of open cornices
b) How to build common types of closed cornices
c) How to install gutters on cornices
d) How to build return and rake cornices
e) How to build a snub cornice
2. Methods of window frame construction

a) How to build basement window frames
b) How to build casement window frames
c) How to build double hung window frames
d) How to build mullion frames
3. Methods of assembling prefabricated window frames
4. Methods of installing window frames in a building
5. How to flash a window frame
6. Methods of building, installing, and applying flashing to a door frame
7. How to apply water tables, corner boards, and belt courses
8. Methods of porch construction
a) How to lay porch floors
b) How to build porch columns
c) How to build and erect porch roofs, cornices, and decks
d) How to build porch steps and balustrades
9. Methods of building front entrances
a) Canopy entrance
b) Recessed entrance

F. Blueprint reading and sketching
1. Essentials
2. Reading plans and details of exterior trim
3. Making *on the job* sketches of exterior trim problems

G. Safety and accident prevention
1. Safety in the use of tools and materials

Side Wall Covering

A. Trade science
1. Description of and characteristics of side wall coverings
a) Bevel siding
b) Drop, matched, and plywood siding
c) Shingle siding
d) Composition siding
2. Selection of materials

B. Trade mathematics
1. Problems in square area
2. Methods of estimating the quantity of materials for side wall covering
3. The use of layout and measuring tools
4. Trade method of figuring amount of materials and labor

C. Trade information
1. Building codes
2. Use of builders' handbooks

D. Special tools, equipment, and materials
1. Stock sizes of side wall covering materials
2. Siding hook — spacing pole

E. Trade processes
1. Methods of applying — building paper, bevel siding, drop or matched siding, wood shingle siding, composition shingle siding

F. Blueprint reading and sketching
1. Essentials
2. Reading plans and details of side walls
3. Making *on the job* sketches of siding problems

G. Safety and accident prevention
1. Safety rules in the use of tools and materials
2. Safety rules in erecting and using scaffolding

Course: Interior Finishing

Plaster Grounds

A. Trade science
1. Function of a plastered wall
2. Types of plaster bases
3. Description of and purpose of terms
a) Furring strips
b) Grounds
c) Backing
d) Corner bead
e) Lath — wood, metal, insulation lath
4. Gypsum board
5. Insulating gypsum board

B. Trade mathematics
1. Methods of estimating the quantity of materials necessary

(*To be continued*)

Industrial-Arts Teacher Education Prepares Also For Industry

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In deciding what courses of study are to be offered in the four-year college training program for the industrial-arts majors, it is important to consider the present-day demand both of general education and of industry.

Since industrial arts is a part of general education it becomes necessary that its aims and objectives are in keeping with those of general education. It is generally agreed among leaders in the field of general education that its main purpose is to present a program that is broad enough to prepare individuals to live most and serve best in this highly industrialized world.

If this need is recognized by colleges preparing industrial-arts teachers and also by the teachers in the field, courses will be offered to give students a basic training in many areas of work rather than a specialized training in a selected few. In order to understand the material things that surround us, as well as the factors involved in their production, it is necessary to have a training program whereby these basic materials are shaped and formed into useful articles. A broadening concept of the ramifications of modern industrial practice and problems is achieved by introducing the students to the elements of design and to the operations or stages incident to processing materials into useful articles of widely varying types. Hence, in carrying out this assignment we equip our shops and laboratories with the basic hand tools and machines necessary to process the materials. Through these experiences which are supplemented by related information, and through the study and visitation of industry, students are able through industrial-arts education to meet the challenge of understanding their industrial world.

With a program of this type where the student does not become highly specialized in one shop area or operation, one might ask the question "How do you claim to train for industry?" In answer to this, let us review the industrial enterprises of today. We can say without reservation that the majority of production industries have de-skilled most of their operation to a point where the operator can be trained on the job in a very short time (one to three weeks) if his mechanical aptitude is average. We also find that industry prefers, in a majority of cases, to do its own training of these semiskilled workers through in-service training programs and the like. Recent surveys of industries bear out these facts and, thus, education for skill alone for many of our students has become outdated in programs claiming to render needed service to industry and to education.

Since industry's needs are now becoming more and more in keeping with general education, the extent of service which is and can be rendered to them by the industrial-arts education programs is unlimited.

The next question which one may ask is "For what types of work would the broadly trained industrial-arts graduate be suited?" This, of course, depends upon the individual's personality, character, and ability to apply himself. Other things being equal we may find him as a director of a training program, supervisor and foreman, classifying and assigning personnel, selling, buying, operating machinery, or operating equipment; in fact, the possibilities for employment with industry are too numerous to mention.

Industrial Arts and Vocational Education

John J. Metz, Editor

THE HOME WORKSHOP

During the war years, and up to the present time, shortages of tools, materials, and supplies have exerted their influence to such an extent that the expansion of the home workshop idea had to be put aside for other matters that needed attention.

The time is approaching, however, when more attention ought to be given to establishing more of these workshops in order that our students develop the habit of occupying their time properly.

Shop teachers are in a favored position to take an active part in developing in their students a love for an exceedingly worth-while activity which will do much to improve the emotional stability and mental health of our present generation.

That such a stabilizing medium is sorely needed is readily understandable. The unrest, uncertainty, and anxiety brought about during the war years by the induction of fathers, brothers, relatives, and friends into the armed forces affected everyone. The breaking down of restraining influences because both fathers, and in many cases mothers, spent more than the normal number of hours in war production plants, all helped to demoralize our youth.

The home shop will help to correct all of this. It may also assist in establishing a better relationship between children and parents. The father and son may again become pals much to the advantage of both. The teacher, then, who assists in re-establishing and multiplying home shops is a public benefactor.

FORESTALLING VACATION ACCIDENTS

The 1947 edition of *Accident Facts*, published by the National Safety Council in Chicago, has just recently been released. Scanning through it, while not entertaining, is very worth while for teachers who have the will and the energy to do something that will help reduce the great number of nonfatal and fatal accidents that are so prevalent.

According to the statistics furnished in the report, mentioned in the foregoing, motor vehicles caused 2386 deaths to persons 5 to 14 years of age. Falls killed 460, burns 920, 1480 drowned, 262 deaths were due to railroad accidents, 594 lost their lives through accidents with firearms, and 110 were killed by poisons or poisonous gases.

Child accident deaths may be divided thus: 1 out of every 3 fatalities due to traffic accidents is a child. One out of every 3 deaths due to burns has snuffed out a young life. One out of every 6 drownings is a child. Mechanical suffocation is the cause of the death of 1 child out of every 11 fatalities caused by suffocation. One out of every 15 deaths due to falls claims a child under 15 years of age. Firearms kill 1 child out of every 22 accidental deaths caused by the improper handling of guns.

Do these statistics pose a problem for teachers — shop teachers especially? Are they a challenge to us to cudgel our brains for some teaching method that will cause a child to remember our admonitions when it is far away from us and our watchful eye during the summer months?

Is it worth trying to do something about vacation safety? Is the saving of over six thousand young lives during the summer months of any interest to our readers?

THE ANNUAL REQUISITION PERIOD

The May issue of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION is annually designated as the requisition number. This is done to remind everyone connected with shop teaching in any form, that an important part of his responsibilities is to see that the materials and supplies which he needs for instructional purposes are on hand when they are to be used; that the tools, machines, and equipment are kept in condition; that new equipment is ordered when needed; and that the expenditures in his department do not exceed the budget that has been set up for it.

This means that the instructor, besides being a teacher, must be able to do considerable bookkeeping if he is to run his shop in a businesslike manner. Records must be kept so that he can show reasons for the money that he spends and give an account of the state of his shop in a reasonable time.

He must be ready at all times to state what the purposes of his work are, to show that the work that he is giving fulfills the purposes that he has set up; that the number of students that he is handling requires a certain amount and kind of equipment if they are to be efficiently taught.

He must be careful not to overequip, and to study his needs most carefully, because any errors of judgment made will make it more difficult to get future requisitions passed.

In making out specifications, it must be remembered that the statement must be complete enough for someone unfamiliar with what is ordered, to make out an actual purchase order. That means that the requisition must show the number of the items wanted, the name of the item, its size and capacity, how finished, the size and description of the motor if one is required to furnish power for the items ordered, and any accessories that may be needed.

To make out such a requisition requires a thorough understanding of what is being ordered. Knowledge of this kind can be gained from the catalogs and description matter distributed by manufacturers and dealers. It is well to have such printed material on hand at all times. The annual March issue of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION, known as the SCHOOL SHOP ANNUAL, contains various kinds of lists that will be helpful when making out requisitions. This issue also contains many advertisements which will be found quite helpful in deciding on the types and sizes of various kinds of materials, supplies, and pieces of equipment.

Incidentally, information once used should not be thrown aside carelessly. Buying any kind of machine is not lightly accomplished. There are items of technical information that must be obtained. Manuals, texts, and catalogs must be scanned. This takes time and energy. It should not be necessary to do it again if, at some future time, a similar machine must be bought. For that reason, and for one's own good, pertinent facts gained, while making a purchase, should be carefully noted down for future use, and the notes should indicate where the information was obtained.

Catalogs, too, should be preserved carefully. They are valuable even if they are usually sent gratis to anyone asking for them.

Some Leaders in Industrial Education

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(*Continued from page 150 of the April, 1948, issue*)

John Daniel Runkle

The teacher of industrial arts in the 1940's may need to be reminded that his subject is an outgrowth of efforts originally intended to provide (*a*) instruction in the use of tools and in the processes of manufacture for students in engineering colleges, and (*b*) instruction in the use of tools and in industrial drawing and design for workers in the factories, with the view of improving the quantity and quality of the products of industry. Limitations of space do not permit me to trace the connections, but an excellent background for an understanding of the first of these movements is given in the second volume of Mr. Bennett's *History*, Chapter 9, The Early Development of Pedagogically Organized Shopwork Instruction. It is necessary to defer until some other occasion a discussion of the second phase.

With reference to the training of engineers and technicians, much was accomplished by the early Mechanics Institutes, beginning in 1820, but the significant developments, from our point of view today, occurred after the Civil War. During and immediately following the Civil War unprecedented expansion took place in every department of our national life, but especially in industry and manufacture, in the construction of railroads and highways, bridges and tunnels, and in all phases of agriculture. This was followed in a few years by the invention of the steel-framed skyscraper, and the miracles of electricity. These changes called for increasing numbers of architects and engineers who could design and plan, contractors who could build, and armies of skilled workers who could do things that had never been dreamed of before.

The first concrete steps to meet these new demands seem to have been taken in the colleges of engineering. In 1862, President Lincoln signed the first Morrill Act, appropriating federal funds for higher education in agriculture and the mechanic arts, and providing the needed stimulus and the opportunity. Bennett describes Worcester Polytechnic Institute, opened in 1868, as "the first institution to make adequate provision" for instruction in the mechanic arts and the processes of manufacture as well as in mathematics and science for prospective engineers and architects. Students received instruction in well-equipped shops, operated on a commercial basis, turning out products to be sold.

As early as 1870, at Illinois Industrial University, now the University of Illinois, a woodworking shop provided instruction for students in architecture, and a metalworking shop for students in mechanical engineering. Stevens Institute of Technology, at Hoboken, N. J., "included shopwork in its course of study from its opening in 1871."

Among the institutions established under the Federal Land-Grant Act, one of the earliest to develop strong courses in shopwork was the Kansas State Agricultural College, at Manhattan. "As early as 1874," this College was offering instruction in carpentry, wagonmaking and repair, blacksmithing, painting, wood turning, wood carving and engraving, printing, telegraphy, and drafting. "A student might pursue one kind of shopwork for four years and so go out with the essentials of a trade as well as his education in science, mathematics, and literary subjects; or, as recommended for students in the agricultural course, he might divide his industrial time among several shops."

I have reported elsewhere on the early work of Dr. Calvin M. Woodward, who, in 1872, inaugurated at Washington University, St. Louis, Mo., a course of instruction in which "certain tool exercise pieces were devised as the most direct and speedy means of teaching the young men how to use tools."

John Daniel Runkle

And now the subject of this sketch enters the picture, John D. Runkle, acting president of Massachusetts Institute of Technology from 1868 to 1870, and president from 1870 to 1878. Dr. Runkle and his associates were struggling with this same problem of rounding out the theoretical equipment of the prospective engineer with the requisite mastery of the practical details of tools, machines, and processes, without unduly prolonging the period of training.

The problem is very clearly stated by Dr. Runkle in a report cited by Bennett. The engineering colleges in placing their graduates learned that the occasional student who entered college having had some practical experience in shopwork, or who obtained such experience during summer vacations, was able to secure employment upon graduation much more readily than his classmates who had no shop experience. Many large employers of engineering graduates did not consider them ready for engineering assignments until after they spent one or two or more years of apprenticeship in the firms' shop.

Commenting on this situation, Dr. Runkle wrote: "This always

seemed to me a fault in the education, yet I did not see the way to remedy it without building up manufacturing works in connection with the school — a step which I knew to be an inversion of a true educational method." He was convinced that some training in the use of tools and machines, and some facility in and adequate understanding of the methods and processes of construction and manufacture, are essential in the equipment of the prospective engineer. At the same time, he recognized that time spent in shops in which the major concern is the production of articles for sale to meet the cost of instruction is not an economical or effective way to achieve the desired end. As he stated the matter in one passage, "The question is simply this — Can a system of shopwork instruction be devised of sufficient range and quality, which will not consume more time than ought to be spared from the indispensable studies?"

The Centennial Exposition of 1876

These few isolated examples of readiness emphasize the dramatic significance and timeliness of the exhibit of the Russian engineering school at the centennial exposition held in Philadelphia in 1876. It was here that answers were found to some of the perplexing questions. The Imperial Technical School for the training of engineers, originally opened in Moscow, Russia, in 1830, began in 1868 the development of a system of instruction in shopwork based on an analysis of the mechanic arts. The results were so satisfactory that the Russians exhibited this system of teaching the mechanic arts at the exhibition of manufacturers, at St. Petersburg, in 1870; in Vienna, in 1873; and at the centennial exposition in Philadelphia, in 1876.

Under the leadership of President Runkle, Massachusetts Institute of Technology made elaborate preparations for taking advantage of the exposition. The University of Pennsylvania granted the use of its campus in Philadelphia for an encampment, and the Commonwealth of Massachusetts loaned the necessary camping equipment from its National Guard Armories. On June 8, 1876, a party numbering more than 370 persons left Boston for Philadelphia, returning to Boston on June 23. Included in the party were members of the faculty, graduates and former students, undergraduates, and a few women. Among other accomplishments, arrangements were made for the collection at the close of the exposition of great quantity of material to serve as the nucleus of the industrial museum which it was proposed to develop at the institute.

The most important result of President Runkle's visit to Philadelphia, according to his biographer, Tyler, was his appreciation of the significance of the exhibit of Russian methods of shop instruction, and of their potential advantage to the institute in particular, and to American education in general. Bennett quotes the following passage from his report:

"At Philadelphia almost the first thing I saw was a small case containing three series of models — one of chipping and filing, one of forging, and one of machine-tool work. I saw at once that they were not parts of machines, but simply graded models for teaching the manipulations in those arts. In an instant, the problem I had been seeking to solve was clear to my mind. A plain distinction between a mechanic art and its application in some special trade became apparent."

Analysis Into Learning Units

In another passage, quoted by Tyler, Dr. Runkle explained how the Russian system is based on the fact that every construction is made up of a combination of relatively simple elements or forms. Many of these forms may be modified in various ways, and they may be combined in infinite variety. These forms may be organized in groups, arranged according to difficulty, and taught in relation to the tools and processes involved.

The distinctive characteristics of the Russian plan, as Dr. Runkle stated them, were *first,* to separate entirely the instruction shops from the construction shops; *second,* to do each kind of work in its own shop; *third,* to equip each shop with as many places and sets of tools, and thus accommodate as many pupils as a teacher can instruct at the same time; and, *fourth,* to graduate the samples to be made in each shop according to difficulty of execution.

Change of Methods at MIT

Upon his return to Cambridge from the Philadelphia exposition, Dr. Runkle set to work immediately on plans for introducing the new methods of teaching at Massachusetts Institute of Technology. He recommended the establishment of a series of shops in which would be taught all the mechanic arts needed by prospective engineers. In these shops the emphasis was to be on instruction rather than on construction. By vote of the Corporation on August 17, 1876, the department was established.

At his request, the Russians supplied him with complete sets of models in the various lines of shopwork, and more detailed information on analysis, processes, organization and equipment of shops, and methods of teaching. In addition to funds available in the institute budget, he received a grant of $3,000 from the Mechanics' Charitable Association, Boston, in return for certain privileges accorded students from the association. Several years later this loan was repaid, and the arrangement terminated.

Tyler is authority for the statement that Dr. Runkle "was the first to appreciate the American need of mechanic-arts instruction based on principles already successfully applied in Russia. He was primarily interested in it as an invaluable addition to existing engineering courses, but he also saw clearly its great potential significance for general secondary education, and so far as possible under pressure of other needs he demonstrated this by the inauguration of the School of Mechanic Arts."

The School of Mechanic Arts

One of the significant features of the newly established department of shopwork at Massachusetts Institute of Technology was a new school of secondary grade, named the School of Mechanic Arts, in which it was proposed to give special prominence to "manual education for those who wish to enter upon industrial pursuits rather than to become scientific engineers." Admission to this school was limited to boys at least 15 years of age who were qualified to enter high school.

It was in the establishment of this school, in his leadership in the development of the curriculum and in the planning of the building and equipment, and in the selection of the teachers and study of methods of instruction, that Dr. Runkle made his contribution to the beginnings of the movement that we now know as industrial arts in public education. His guiding hand was soon removed, however, for two years later, in 1878, Dr. Runkle was obliged by failing health, brought on by overexertion, to resign his position as president of the institute. He left at once for a trip to Europe for a change of scene and to rest and recuperate.

He returned to the institute in September, 1880, much improved in health, and resumed his former duties as professor of mathematics. He thus was less directly concerned with instruction in shopwork, and left to others the detail of further progress, not only on the engineering college level but especially on the secondary school level in the School of Mechanic Arts.

A Philosophy of Education

During the two years of sojourn in Europe, 1878–80, Dr. Runkle did not spend a great amount of time in rest and idleness. As soon as he had partially regained his health and buoyancy he began a rather systematic study of education in several countries, with special attention to manual and industrial education, in which his interest had been aroused by the Russian exhibits. His studies of these schools and experiments were summarized in the reports and public addresses mentioned elsewhere in this sketch.

His conclusions were expressed in a series of resolutions which he drew up for presentation to the annual convention of the American Institute of Instruction, in 1884:

1. "The single aim of public education should be the physical, mental, and moral training of the young, by all suitable means and agencies; and no study or discipline which is not adapted to these ends for all pupils should be introduced into the public schools and supported at the public expense.

2. "While the training of the mental faculties must always be the first and distinct aim of all education, still this training is most effective when all the senses are most fully brought into play as factors in the general process.

3. "We believe that hand instruction, no matter of what kind, if adapted to the age of the pupil and properly conducted, can be made disciplinary, and a valuable adjunct to the purely literary studies.

4. "We believe that hand study, requiring not more on the average than one hour per day, can be introduced into the public schools without impairing the educational value of the studies now taught, and with no abridgment of the time now devoted to them which will not come through better methods of teaching, or on other grounds.

5. "We believe that a workshop, as part of the apparatus of a public school, is as desirable as a science laboratory is to the technical school or college.

6. "It is the deliberate opinion of this association that the time has come when handwork should be taught to the proper extent in all public schools, both because of its educational value, and because the social and industrial conditions have so changed as to make such teaching necessary."

I turn now to a brief review of the more personal biographical data available.

(To be continued)

Upholstery Work in Schools

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There have recently been many requests for outlines of teaching upholstery work from various schools, especially vocational and private schools. Schools offering this type of work should engage a skilled craftsman to teach this subject. See the cover picture on this magazine.

The craftsman, regardless how skilled he may be in this trade, usually finds it difficult to break down the various operations and jobs. These craftsmen from industry may know their subject matter and may even have a natural ability to teach; yet, they are often at a loss when it comes to thinking in educational terms. They are more often likely to think and teach in terms of production rather than instruction.

The following course outline for upholstery was prepared and is used by the author in a vocational school system to teach:

1. Vocational students who are employed at this type of work in industry, and who attend vocational school one day each week.

2. Veterans who are employed at this type of work as "on the job training" or as apprentices. These veterans attend school four hours per week for related and technical information, and, to some extent, receive training on manipulative skill which may not be available to the student at his place of employment.

3. Full-time students, mostly veterans who are enrolled under the G.I. bill and who wish to pursue this type of work as a livelihood.

As most of these veterans are planning to do custom-built upholstery and wish to do repair work on upholstered furniture, emphasis should be placed on this, rather than training for only one phase of the trade.

TRADE PREPARATORY — UPHOLSTERY

Objective

To provide individual training for students in the field of upholstery, to acquaint them with trade terms, shop practices, and prepare them for the field of upholstery.

To help people in any state of life to prepare for a job, to hold a job, to get a better job, to advance in the work, and to believe in their job.

The trade should be broken up into a great number of processes so that a beginner can start at the bottom and advance as rapidly as his ability permits. For those with previous experience, the course must be so flexible that these people can begin on the processes and problems with which they are still unfamiliar.

The course should be broken into four major parts: (1) related information; (2) processes; (3) mathematics; (4) jobs.

Related Information

This information should include familiarity with tools and equipment. It is also necessary that the student should be able to converse intelligently about the values of covering material; sources of materials; kinds, grades, and qualities of supplies; and workmanship. He should be familiar with trade names and terms. Various styles, types, and qualities of upholstered furniture should be compared and the types of upholstery coverings appropriate to each class should be noted.

Various methods of frame construction should be studied, together with the kinds and thickness of woods, dowels, braces, corner blocks, and glue used in the manufacturing of the furniture frames.

Tools: types, kinds, sizes, uses, handling, safety.

Equipment: types, kinds, uses, handling, upkeep, safety.

Supplies:

Tacks: sizes, where used, importance of using proper sizes, kinds.

Metalline nails: kinds, colors, sizes, designs, where used.

Twines: kinds, where used.

Gimps: kinds, colors, where used.

Webbing: sources, kinds, widths, uses.

Springs: kinds, sizes, shapes, where various kinds, sizes, and shapes are used.

Edge-wire: sizes and kinds to use.

Burlap, muslin, denim, cambric: sources, kinds, widths, uses, grades.

Stuffings: such as moss, hair, tow, sisal, cotton felt, silk floss, feathers and down, sponge rubber.

Sources, grades, advantages and disadvantages, kinds, qualities, where used.

Coverings: such as mohair, velour, tapestries, friezes, bracatelle, damask, corduroy, rep, cretonne and chintz, leather and artificial leather, plastics.

Sources, grades, widths, qualities, kinds, colors, uses.

Frame construction: woods, dowels, glue, braces, corner blocks.

Processes

This part involves the actual manipulation of tools, equipment, and supplies. Although it is most desirable and interesting for students to work on actual frames which are to be upholstered, certain processes require more practice than others. For the latter it is advantageous to use pseudo frames until the process is mastered, as a frame would soon be deteriorated where ripping out tacks are necessary to make corrections or for repeating the process. A demonstration with technical information on the processes would be most beneficial to all students.

As each process is broken up into various steps, it is not necessary to perform all of the processes in sequence. However, it may be beneficial and advantageous to the student if certain processes were completed before attempting others, such as webbing a job before sewing and tying springs; making a layout plan before cutting the cover; upholstering a job in muslin before covering same, especially where covers have to be cut to fit around posts and corners.

Process 1

1. *Webbing:* layout, tacking, stretching, interlacing.

2. *Springing-up:* sewing springs to webbing, tacking springs to wood, fastening sprint twine to frame, tying springs to height (round seat), tying springs to height (flat seat), cross-tying springs, tying springs for a spring edge, fastening wire to a spring edge (*a*) with wire clips, (*b*) with twine, cutting burlap for over springs, attaching burlap over springs, sewing burlap to springs.

3. *Roll edge:* cutting burlap for a roll edge, tacking burlap for a roll edge on straight wood, tacking burlap for a roll edge on square corners, tacking burlap for a roll edge on curves or rounded corners, stuffing and forming the roll edge, tacking the roll edge.

4. *Stitched edge on wood:* cutting burlap for a stitched edge on wood, sewing the burlap to the springs, stuffing the stitched edge, tacking the stuffed burlap to the frame, stitching the edge (blind stitch), stitching the edge (roll stitch).

5. *Stitched edge on a spring edge:* cutting the burlap for the stitched edge, sewing the burlap to the springs, stuffing the edge, pinning the edge, sewing the stuffed burlap to the wire edge, stitching the edge (blind stitch), stitching the edge (roll stitch).

6. *Stuffing with muslin cover:* picking the stuffing, spreading and laying the stuffing, sewing the stuffing down, measuring and cutting the muslin cover, stretching and tacking the muslin cover over the stuffing, cutting the muslin cover for corner posts and slats, laying pleats in muslin cover.

7. *Power sewing machine operation:* threading the machine, threading and filling the bobbin, replacing the needle in the machine, regulate sizes of stitches in the machine, sewing straight seams, sewing welt, joining seams with welt inserted, sewing cushions with welt inserted between the seams.

8. *Putting on covers (covering):* centering the cover with the frame, stretching and tacking the cover, making corner pleats, cutting the cover to fit around corner posts, cutting the cover to fit around wide slats.

9. *Making loose cushions for overstuffed furniture:* measuring size of cover required for the cushion, marking the cushion cover to shape, cutting the cushion cover to shape, cutting the cushion border, cutting the cushion welt, sewing the cushion welt, joining the cushion borders to the cushion tops, with welt inserted between the seams.

10. *Stuffing a loose cushion with inner spring center:* selecting the size of inner spring, placing the cotton around the inner spring, stuffing the cotton and inner spring into the cushion, (*a*) by hand (*b*) with cushion stuffer, closing the stuffed cushion.

11. *Making a down-and-feather filled cushion:* measuring sizes of material required for the casing, cutting the casing material to size and shape, sewing the casing material covering, filling the casing, closing the filled casing, measuring the size of cover required for the cushion, marking the cushion cover to shape, cutting the cushion cover to shape, cutting the cushion border, cutting the cushion welt, sewing the cushion welt, joining the cushion borders to the cushion tops with welt inserted between the seams, inserting the filled casing into the cushion, closing the stuffed cushion.

12. *Making upholstery cloth covered buttons:* selecting pieces of covering for buttons, (*a*) amount, (*b*) color, cutting the pieces of covering to size, operation of button machine, making the button (*a*) loop type, (*b*) tuft, (*c*) clinch, (*d*) tack.

13. *Putting on outsides and trim:* blind-tacking covering, hand sewed covering, metalline nailing, gimping with gimp tacks, gimping with metalline nails, gimping with glue, covering loose wood panels, attaching loose wood panels, making a stuffed panel, with metalline nail trim.

Mathematics

This part of the course is especially valuable to the foreman in a shop, to the cutter of upholstery cloth, or to the man who contemplates doing repair work on upholstered furniture. It deals with estimating, layout and planning for amount and purchasing of supplies, materials and coverings used in upholstering.

In estimating the amount of covering necessary for a piece of furniture, it is extremely important that the calculations are accurately made, and that no unnecessary waste of covering is left after all the pieces of covering are cut. It would also be quite a loss in the event that a job was based on a certain amount of covering yardage, and then discover that, due to improper cutting, more cover will be required.

Measuring for covering. Number of pieces required; sizes of pieces required, allowing for sewing where covers have to be joined; measure all pieces, *width by length.* This will prevent covers from being cut sidewise, where up and down are necessary.

Making the layout plan. Make a layout plan, including all pieces required. Take care that all pieces are laid out as measured.

It may be advantageous to lay out all the large pieces first, as the smaller pieces may be filled in from the waste.

Jobs

Authentic upholstery jobs should be used when possible, beginning with slip seats for dining room chairs and the simple board-top stools. These will involve a number of the simpler processes. Next, pull-up chairs and boudoir chairs which will involve a greater variety of processes and may require more repetition to master. These will also require that the students do some thinking and planning, especially as to cut-

ting the cover for corner posts and for making pleats. The larger overstuffed chairs, barrel chairs, and davenports can be upholstered on new frames, which may be ordered from frame manufacturers, or on repair work. Repair work, however, for this course, should be taken in school only if it contains educational value, and then only to a limited amount for educational purposes. Also, production or time limit set on any repair job should never be entered into, as this may jeopardize any educational value the job may possess.

The following are suggestive jobs. These may have to be modified according to the various jobs available.

1. Pad seat. Dining room chairs and board-top stools.
2. Spring seat, pull-up chairs, and spring footstools.
3. Saddle-seat pull-up chairs.
4. Upholstering backs on pull-up chairs.
5. Spring seat, boudoir chairs.
6. Upholstering backs on boudoir chairs.
7. Upholstering round arms on boudoir chairs.
8. Upholstering a platform over a stitched edge.
9. Attaching and stuffing a front, welted, sewed-on border.
10. Attaching and stuffing a front, welted, tacked-on border.
11. Upholstering round arms on overstuffed chairs.
12. Upholstering backs on overstuffed chairs.
13. Upholstering buttoned backs on wing chairs.
14. Upholstering round arms, with wing attached.
15. Upholstering a 3-sectional back on davenports.
16. Upholstering loose cushion effect backs on davenports.
17. Piping, straight backs.
18. Piping, fan-shaped backs.
19. Tufting, square and oblong backs.
20. Tufting, round and oval-shaped backs.

Our Industrial Objective

LAURENCE V. CALVIN
Instructor of Industrial Arts
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Athens, Ohio

This seems to be an era of questions and conflicts, and one most puzzling to youth as well as to the teachers of youth. Upon what is our future security built?

When we read of the problems created by labor costs it causes us to wonder how far the vicious circle can be traveled without having our national economy upset completely. Certainly no one would want to deprive the worker of his wage or any part of it, but just as certainly, shouldn't the worker be willing to sell his day's work at a profit to his employer? There seems to be a stong indication that some youth of today are forming the idea that it is a desirable and popular practice to get by with as little output as possible. Even adults seem to have such a philosophy of life. Where will such an attitude lead us? Who is responsible for its existence? What can be done about it?

History and observation lead us to believe that real progress in any line of endeavor is accomplished by work, good old-fashioned hard work. It takes many forms, from the farsighted over-all study, planning and dreaming of the man at the top down to the routine and lowly skilled jobs of the little man at the bottom. All are important and must exist. It may not matter so much what one does as how much he does and how well he does it.

We call our area in the school *industrial arts*, and strive toward certain objectives which are considered good. No doubt, we have made and are making definite and desirable contributions in formulating desirable qualities in the lives of our students. However, how nearly are we accomplishing all that we should. What value will come from a complete understanding of all that we would teach in our industrial-arts classes unless such knowledges and abilities are coupled to a wholesome attitude and an ambitious application? It seems that here is a fertile field for development by the teacher of industrial arts. Perhaps our contribution can be greater if we enable our students to develop a greater appreciation of and a love for work. It seems that our curriculum might be intensified in content and standards regarding both quality and quantity. It isn't too much for the teacher to expect the student to give a full hour's output for an hour's time. It seems that we can leave lasting and proper impressions on the minds of our students by helping them see the current problems and deficiencies around us which may be traced to unwholesome attitudes or lack of application. Let's all examine our courses and methods and add more learning experiences which will cause our students to acquire a greater assumption of responsibility in helping to correct the attitude of nonproductivity which threatens even our moral existence. Let's remember that we are not just teaching industrial arts for the sake of the knowledges and skills involved, but that we are teaching youth to live pleasantly, profitably, and harmoniously in a free society where each must assume his proper share of responsibility. Let's develop in our students a real love for work.

Robert G. Brierly, Carboloy instructor, is shown demonstrating cutting speeds, feeds, and depths of cut now possible with carbide tools, to a group of 22 Illinois vocational instructors at Peoria, Ill.

Testing and Tests

SENIOR HIGH INDUSTRIAL-ARTS TEST — CAREERS IN ELECTRICITY

WILLIAM H. BOWERS
High School
Tuckahoe, N. Y.

NOTE: The following test contains statements. Some are true and others false. Place a *T*, or an *F*, before each statement. Deduct 2 per cent for each statement answered incorrectly.

.... 1. The electrical industry is able today to use the talents and skills of mechanics, artists, chemists, engineers, and accountants.

.... 2. Your career should be built upon the skills you have, the ones you daydream about in your everyday life.

.... 3. An expert uses a horizontal sealing machine to seal parts of a big tube for a 100 kilowatt transmitter.

.... 4. The chemist mixes a batch of phosphors that will coat the outside of a General Electric fluorescent lamp.

.... 5. Because of the marvelous advancements during the past fifty years in the electric field, the electric development of America is about completed.

.... 6. Modern electric dishwashers churn china and glassware around like clothing.

.... 7. There is today a great need for men of vision and courage to keep pace with the electrical developments.

.... 8. Most of the men in the radio and appliance fields started in as lathe hands a few years ago.

.... 9. The electrical manufacturing plants need mechanics, engineers, and managers.

.... 10. The General Electric consists of two companies, which are divided into eight departments.

.... 11. The apparatus department, with headquarters in Schenectady, N. Y., builds and sells generators, transformers, and motors.

.... 12. The lamp department is located in Cleveland, Ohio, and provides lighting for home and industry.

.... 13. The appliance and merchandise department of the General Electric Co. is located in Providence, R. I.

.... 14. The above department produces a large variety of home receivers, also conduit, switches, and wiring devices of all types.

.... 15. Television transmitters are made in the electronics department, soon to be located in Syracuse, N. Y.

.... 16. The chemical department, located in Milwaukee, Wis., is the second largest producer of finished plastics products in the world.

.... 17. Cooling and refrigeration units are made in Bloomfield, N. J., to meet the new demand for low temperature applications in industry.

.... 18. The General Electric Co. produced two million electric motors yearly for the U. S. armed forces.

.... 19. Gears reduce the high speed of turbines to obtain lower ship-propeller speeds.

.... 20. Scores of college graduates enter the General Electric lamp department, spending the rest of their lives developing better lamps.

.... 21. The manufacturing operations of General Electric lamp department are far-flung, consisting of 42 plants in ten different cities.

.... 22. The large shop at Cleveland, Ohio, employs men with many skills, such as design and mechanical engineers, draftsmen, toolmakers, machinists, all devoting their efforts toward better lampmaking.

.... 23. The present 60-watt filament lamp is 75 per cent more efficient than its 1923 ancestor.

.... 24. The cost of fluorescent lamps has increased 40 per cent since 1938.

.... 25. Salesmen are considered by many as being of greater importance than factory workers, in order to make our country prosperous.

.... 26. A man should choose the way of life that can bring him, and him alone, the most happiness.

.... 27. A salesman knows that because of his ability and personality he can almost always command a very good income.

.... 28. Retail appliance selling offers a good man security and compensation in just proportion to his efforts, sincerity, and ability.

.... 29. The General Electric refrigerator was placed on the market in the year 1920.

.... 30. Receiver, transmitter, and industrial tubes are not included as original equipment to the manufacturers.

.... 31. Two thousand wholesalers are required to distribute replacement tubes.

.... 32. Twenty-five General Electric television stations are operating in seven centers of population across the country.

.... 33. It is predicted that by 1950 there will be 200 stations serving 50 million people.

.... 34. A television station offers many career possibilities, such as script writers, costume designers, stage set builders and designers, lighting experts, camera dolly operators, and many more.

.... 35. Unlimited opportunities exist today in all phases of the electronic field, in research, design, sales, and service.

.... 36. The best start toward a career in the electrical industry is a high school diploma.

.... 37. To obtain the better positions in the electrical industry, one must obtain better training than a *high* school gives to a student.

.... 38. The most important subjects in the high school curriculum that will help a boy in obtaining a better position are social studies, Spanish, and mechanical drafting.

.... 39. Skillful use in handling tools assures a student that he will become a successful electrician.

.... 40. High school mathematics is entirely unnecessary in the electrical industry.

.... 41. It is an easy matter to obtain employment in the electrical industry as the unions are very glad to employ young men.

.... 42. If you do not desire to continue your studies in high school, enter the electrical union, where you will receive promotion without additional study.

.... 43. After serving a two-year apprenticeship you are then classed as a journeyman.

.... 44. A technical college education immediately insures you a lucrative position.

.... 45. A fourth-year apprenticeship boy received $28 per week.

.... 46. When training one must be interested in the common paths which eventually lead to promotion.

.... 47. There are approximately 11 different major fields in the electrical industry.

.... 48. Upper level jobs are immediately obtained after being graduated from an approved electrical college.

.... 49. A young engineer must complete many intermediate jobs before he reaches the upper-level jobs.

.... 50. Training-level jobs must be accom-

plished at the lowest level and the student electrician must be adept in those different jobs before he is advanced.

.... 51. Special aptitudes during the apprenticeship are often discovered by the foreman who advises the young man to cash in on one of them, even though they sacrifice their original training objectives.

.... 52. The wages and endeavors of men employed in the electric field are the same whether in Ansonia, Conn., or Newark, N. J.

.... 53. The wages of beginners in the electrical field are at present about $25 per week.

.... 54. The electrical workers who have been promoted from the beginners' stage range from $25 to $60 weekly, as his responsibility increases.

.... 55. The wages and salaries of those working in the electrical industry are lower than those working in the ceramic and textile industries.

.... 56. All the electrical workers in all sections of the U. S. have similar security and pension benefits regardless as to what section of the country they work in.

.... 57. The Bell Telephone Co., due to its many employees, is the first concern to lay off employees during depression periods.

.... 58. The employees of the large electric companies are advanced quicker than those employed by small concerns.

.... 59. The greatest opportunities in the entire electrical industry are in the sales organization.

.... 60. Generally speaking positions in the electrical industry offer good security when compared to those in other fields.

.... 61. The security of the beginners is greater than that of those employees in the upper level because their wages are smaller.

.... 62. Many electric employees in the upper level earn from $2,500 to $5,000 and up per year, especially those employees who have engineering degrees.

.... 63. The radios produced by Westinghouse and the General Electric Co. have distributing stations in 48 states.

.... 64. The above distributing centers service between 15,000 and 20,000 independent dealers throughout the U. S. and Hawaii.

.... 65. Radio tubes are not sold as original equipment in the higher priced sets.

.... 66. Marine equipment consists of beacons, search-radar equipment, and coastal radio-telephonic equipment.

.... 67. Television is very similar to other forms of radio entertainment.

.... 68. A television station offers many types of careers, most of them comparatively new.

.... 69. There are about 2,633,144 television stations now in use in the United States.

.... 70. A basic knowledge of electrical engineering is a valuable asset in the television industry.

.... 71. Electronic development was at a standstill during the recent war because of the demand for more essential objects contributing to ultimate success.

.... 72. Before the war the plastic industry quadrupled in size.

.... 73. Almost every piece of equipment furnished by the General Electric Co. has some plastics in it.

.... 74. In the development engineering laboratory, the electrical engineers are concerned with molding, press designs, methods of preheating, and modern methods of insulation.

.... 75. In industrial plants, new uses for air conditioning and refrigerants for processing are being constantly developed.

.... 76. Forty-three per cent of all homes in the U. S. have automatic heat controls.

.... 77. It is predicted that between 4 and 5 million homes will install automatic heating devices during the next year.

.... 78. There are about 500,000 retail stores in the U. S. that use refrigeration for meats, ice cream, and dairy products.

.... 79. There is a big demand for electrical engineers, for designing, application engineering, and for commercial engineering activities.

.... 80. A good engineer may become a sales manager, selling refrigeration and air conditioning to factories and homes.

.... 81. The large manufacturing companies, Westinghouse and the General Electric Co., employ many salesmen for distributing, and for training installation and operating engineers.

.... 82. The commercial and domestic air conditioning market is for the self-contained units and the remote installations.

.... 83. The scope of activity for salesmen is very limited in the appliance branch of the electrical industry.

.... 84. Hundreds of opportunities are open for both experienced and unexperienced men in the General Electric firm.

.... 85. The most efficient leaders in the electric industry are those who have specialized in one particular phase of the industry.

.... 86. The training program in the General Electric industry is for apparatus men only.

.... 87. All college graduates who enter the employ of the Westinghouse and General Electric concerns are immediately trained to be upper level men, who will carry on their endeavors along one special phase of electricity.

.... 88. Due to the size of these large manufacturing plants all engineers soon become just cogs in the machine.

.... 89. The design engineering course is given at Schenectady, N. Y., for designers and draftsmen who haven't completed college training in this type of work.

.... 90. To be a student in the design course the student must have had algebra, geometry, trigonometry, and physics.

.... 91. Accounting courses are given in elementary, corporation, auditing, industrial cost, and advanced Spanish.

.... 92. Any student who has an average of 76 per cent can secure scholarships from both General Electric and Westinghouse, by contacting these manufacturing companies.

.... 93. Training at the General Electric is offered in several trades to high school graduates.

.... 94. Today there are 6532 research people employed by the General Electric Co.

.... 95. All scientists employed in the General Electric Co. are encouraged to work alone, as individuals because of the confusion often resulting from two or more opinions on various matters.

.... 96. Silicone rubber from which super gaskets are made becomes elastic after being aged for three weeks.

.... 97. One thousand volt electrons give scientific tests a definite means for studying electrons in a form never before possible.

.... 98. Scientific progress is the most wonderful weapon of all toward promoting the peace and reconstruction of the entire world.

.... 99. It is very possible that jet propelled planes will some day fly through the air, ten miles above the earth, at a speed of 1500 miles an hour.

....100. The General Electric stratometer goes up 18 miles in the air, and signifies the approach of enemy planes.

REFERENCES

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"A Career in the Electrical Field," Rochester Inst. of Technology, Rochester, N. Y.

"Electrical Occupations," by Klienfelter.

KEY

1. T	14. F	27. T	40. F	53. T
2. T	15. T	28. T	41. F	54. T
3. F	16. F	29. F	42. F	55. F
4. F	17. T	30. F	43. F	56. F
5. F	18. T	31. F	44. F	57. F
6. F	19. T	32. F	45. F	58. F
7. T	20. T	33. F	46. T	59. T
8. F	21. F	34. T	47. F	60. T
9. T	22. T	35. T	48. F	61. F
10. F	23. F	36. T	49. F	62. T
11. T	24. F	37. T	50. T	63. T
12. T	25. T	38. F	51. T	64. T
13. F	26. F	39. F	52. F	65. F

66. T	73. T	80. T	87. F	94. F
67. F	74. F	81. T	88. F	95. F
68. T	75. T	82. T	89. T	96. F
69. F	76. F	83. F	90. T	97. F
70. T	77. F	84. T	91. F	98. T
71. F	78. T	85. F	92. F	99. T
72. F	79. T	86. F	93. T	100. F

AIRCRAFT IGNITION TEST

WALTER M. GORDON
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General directions: Read each question carefully and answer as directed at the beginning of each part. This is not a test to see how fast you can work; it is a test to see how much you know. If you do not know the answer to a question, do not spend too much time on it; proceed to the next questions and then to the next part. No questions will be answered after the examination begins. Are there any questions now? If not, begin.

Part I

Directions: Some of the following statements are true, and some are false. In each case write *T* on the left of the statement if you think it is true, or write *F* on the left if you think the statement is false.

( ) 1. The magneto may be called a direct current generator.
( ) 2. In a magneto the primary winding is made up of a few turns of very fine wire.
( ) 3. The primary winding of a magneto must never have the same common ground as the secondary winding.
( ) 4. The magneto primary winding produces low voltage.
( ) 5. The breaker assembly interrupts the primary circuit when the low voltage is at its peak.
( ) 6. On a compensated cam the lobes are spaced evenly.
( ) 7. A magneto should be internally timed as well as timed to the engine.
( ) 8. Pivotless type breaker assemblies are never adjusted to any set linear measurement.
( ) 9. Flashover in a distributor is due mainly to improper timing.
( ) 10. As long as current is flowing steadily in the primary circuit there will be a higher voltage flowing in the secondary circuit of a magneto.
( ) 11. Voltage in the secondary circuit may reach as much as 18,000 volts.
( ) 12. Spark plugs must operate under high temperatures but not under high pressure.
( ) 13. High tension leads must be checked periodically for voltage leakage.
( ) 14. Ignition harness is more likely to "leak" or break down at high altiture.
( ) 15. On a dual magneto the number one lobe on the compensated cam is for number one cylinder and is indicated by a dot.
( ) 16. The pivotless type breaker assembly spring tension should never be checked.
( ) 17. Radial engine ignition is set to fire the plug on the compression stroke.
( ) 18. The compensated cam always rotates at twice the speed of the distributor rotor.
( ) 19. Ignition systems have been pressurized to increase their efficiency at high altitude.
( ) 20. A shorted primary condenser will cause arcing of the breaker points.
( ) 21. The low tension high altitude ignition system provides less opportunity for "flashover" or high tension leakage.

Part II

Directions: The following are sentences with missing words or phrases. Fill in the blanks with the correct words or phrases necessary to complete each sentence.

1. A .... is connected across the breaker assembly to prevent arcing of the points.
2. A .... is used to operate the breaker assembly.
3. On radial engines a ..... cam must be used in order to have all cylinders fire at the desired period.
4. Excessive oiling of the cam follower will cause burning or fouling of the .....
5. Breaker points are usually made of .....
6. On smaller aircraft an ..... takes the place of a magneto.
7. The ..... sends current to the proper spark plug at the proper time.
8. ..... plugs are better suited for engines with a high compression ratio.
9. The main reason for shielding high tension ignition cables is to prevent .....
10. A common method of testing ignition harness for voltage leakage is to apply high voltage between the ..... and the .....
11. The meaning of the letters or numbers in the following magneto designation are:
D = ...
F = ... R = ...
18 = ... N = ...
12. A ..... spark is used when starting the engine to prevent kickback.
13. The ignition switch is connected to ground when it is in the ..... position.
14. Continuous arcing and pitting of breaker assemblies would be caused by ..... or .....
15. A ..... is used to supply high voltage for starting until the "coming in" speed of the magneto is reached.

Part III

Directions: The meaning or association of the words in the numbered items are to be found in the lower list. In the space to the left of each number write the letter from the lower list which explains the meaning or association of that particular word or words:

..... 1. rotor
..... 2. bomb test
..... 3. preignition
..... 4. pole shoes
..... 5. primary winding
..... 6. secondary winding
..... 7. distributor block numbers
..... 8. battery ignition switch
..... 9. magneto ignition switch
..... 10. retarded spark
..... 11. advanced spark

a) approximately 200 turns of wire
b) closed when "off"
c) magneto sparking order
d) distributes voltage from magneto to individual cylinders
e) denotes firing order of engine
f) used to operate engine after it has started
g) used when starting
h) open when "off"
i) to check spark plugs' ability to withstand compression
j) soft iron laminations
k) approximately 12,000 turns of wire
l) may be caused by overheated spark plugs
m) to check plugs' ability to fire at high altitude

Part IV

Directions: Each incomplete sentence is followed by a group of words or phrases. Underline the correct words or phrases following each sentence which will complete that sentence.

1. When checking ignition harness on an airplane for voltage leakage, it is very important that:
a) the spark plugs be removed from the engine
b) the engine ignition switch is turned "off"
c) the magneto and spark plugs be disconnected from the harness
d) the distributor is disconnected

2. Pitted ignition breaker points should be honed with:
a) emory cloth
b) sandpaper
c) honing kit and stone
d) flat bastard file

3. If after timing, the magneto breaker point clearance is increased, the result will be:
a) an increase in fuel consumption
b) a later firing of the cylinder
c) an earlier firing of the cylinder
d) an increase in spark intensity

4. If an ignition switch is shorted the result would be:
a) misfiring at low r.p.m.
b) misfiring at high r.p.m.
c) that the engine could not be stopped
d) that the engine could not be started

5. Complete magneto failure would be caused by:
a) grounded primary coil
b) open primary coil
c) open ignition switch circuit
d) shorted high tension lead to any one cylinder

KEY AND SUGGESTED SCORING

Part I (one point each)

1. F	5. T	9. F	14. T	18. F
2. F	6. F	10. F	15. T	19. T
3. F	7. T	11. T	16. F	20. F
4. T	8. T	12. F	17. T	21. T
		13. T		

Part II (three points each)

1. condenser
2. cam
3. compensated
4. breaker points
5. platinum alloy
6. ignition coil
7. distributor
8. cold
9. radio interference
10. ignition wire, shield
11. dual, flange mounted, number of cylinders, right hand rotation, code or company
12. retarded
13. "off"
14. over oiling, bad condenser
15. booster coil

Part III (one point each)

1. *d*
2. *i*
3. *l*
4. *j*
5. *a*
6. *k*
7. *c*
8. *h*
9. *b*
10. *g*
11. *f*

Part IV (one point each)

1. *c*
2. *c*
3. *b*
4. *d*
5. *b*

AERODYNAMICS TEST

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General directions: Read each question carefully and answer as directed at the beginning of each part. This is not a test to see how fast you can work; it is a test to see how much you know. If you do not know the answer to a question, do not spend too much time on it, but proceed to the next questions and then to the next part. No questions will be answered after the examination begins. Are there any questions now? If not, begin.

Part I

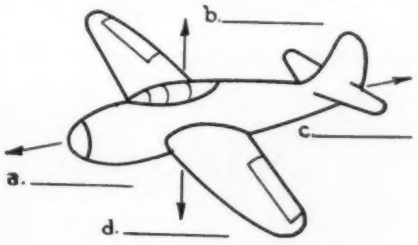
Directions: Some of the following statements are true, and some are false. In each case write *T* in the space to the left of the statement if you think it is true, or write *F* in that space if you think the statement is false.

( ) 1. Aerodynamics pertains to the history of aviation.
( ) 2. The study of aerodynamics, a comparatively new subject, had its beginning in the year 1910.
( ) 3. The throat of a Venturi tube is always narrower than the inlet.
( ) 4. The pressure on the upper surface of a wing moving through the air is slightly less than atmospheric pressure.
( ) 5. As the angle of attack of a wing increases the positive pressure exerted on the wing's lower surface increases.
( ) 6. Every square foot of area on the top surface of a moving wing has an equal amount of air pressure exerted on it.
( ) 7. The angle of attack of an airfoil can never be increased to a point where it would be undesirable.
( ) 8. When the angle of zero lift is reached, all the lift is on the top of the wing and none is on the lower surface.
( ) 9. A chord of an airfoil is an imaginary line drawn along the lower surface from the leading edge to the trailing edge.
( ) 10. Wing surfaces are made as smooth as possible in order to make the air flow at the aft part of the wing less turbulent.
( ) 11. With the angle of attack remaining constant, drag is decreased as altitude is increased.
( ) 12. Increasing the aspect ratio for a given wing area will increase the lift.
( ) 13. The lack of longitudinal stability will cause an airplane to pitch (nose up or down).
( ) 14. The glide angle of a plane is not affected by the weight of the plane or by variations in the load it carries.
( ) 15. Weight of a plane or of its load will help determine the speed of the plane along the glide angle.

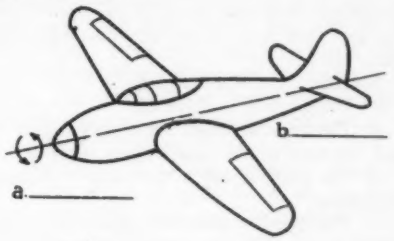
Part II

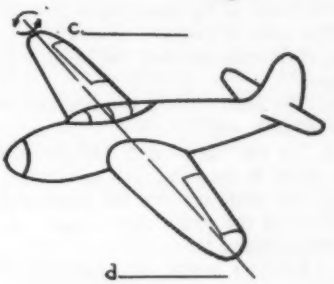
Directions: Fill in each blank with the correct word.

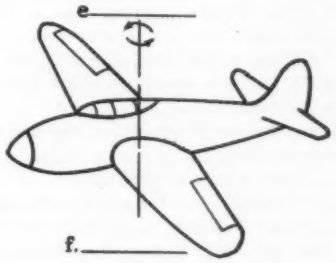
1. The four main forces affecting flight are:



2. Name the axis in each sketch and the term applied to the rotation of the airplane about each axis.







Part III

Directions: The meaning or association of the words in the left-hand column are to be found in the right-hand column. In the space to the left of each number write the letter from the right-hand column which explains the meaning or association of that particular word or words.

.... 1. cambered airfoil	*a*) the breaking down of a streamline flow about a body
.... 2. airfoil	*b*) angle formed by plane of the wing with the plane of the wing chord
.... 3. vector	*c*) curved airfoil
.... 4. burbling	*d*) line indicating both amount and direction
.... 5. dihedral angle	*e*) true height above sea level
.... 6. angle of incidence	*f*) same as angle of attack or wing setting
.... 7. absolute altitude	*g*) the height of an aircraft above the earth
.... 8. positive angle	*h*) any section on an airplane designed to obtain a useful reaction from the air through which it travels
.... 9. design load	*i*) the acute angle between two planes
.... 10. corrected altitude	*j*) leading edge higher than trailing edge
	k) weight empty plus useful load
	l) a specific load below which there should be no structural failure

Part IV

Directions: Each incomplete sentence is followed by a group of words or phrases. Underline the correct words or phrases following each sentence which will complete that sentence.

1. Stalling angle of an airplane is:
   a) The angle of positive lift
   b) The angle at which lift rapidly decreases and the nose of the plane begins to drop
   c) The angle at which the engine will cease to operate
   d) The speed at which lift rapidly decreases and the nose of the plane begins to drop
2. The angle of attack of a wing is:
   a) The angle between the fuselage and the wing
   b) The angle between the wing and the wing flap when down
   c) The angle between the relative wind and the chord of the wing
   d) The angle between the upper and lower surfaces of the wing
3. Wing loading is:
   a) Ratio of weight of airplane to area of the wing
   b) Ratio of wing area as compared with elevator area
   c) Amount of pay load carried in the wing
   d) The point at which excessive stress will cause the wing to fail
4. The purpose of the tail wing (stabilizer and elevator) is to:
   a) Obtain static stability only
   b) Raise and lower the nose of the airplane
   c) Obtain dynamic stability as well as to provide an easy means of ascending and descending
   d) Aid in supplying lift
5. Wing dihedral is used:
   a) To provide more area on the lower surface of the wing thus providing more lift
   b) As a means of providing lateral stability, especially during a sideslip
   c) To increase maneuverability
   d) To change the air flow over the wing (down-wash) and thus increase the efficiency of the stabilizer and elevators

Part V

Directions: Some of the following statements are true and some are false. In each case write *T* on the line to the left of the statement if you think it is true, or write *F* on the line to the left if you think the statement is false. If the statement is false fill in the blank at the right, with the word which makes the statement true. Underline the word which makes the statement false.

.... 1. As area decreases velocity decreases. ....

.... 2. In a Venturi when the speed of air increases the pressure will increase. ....

.... 3. The greater the angle of attack of a wing the less the drag. ....

.... 4. The heavier the airplane load the greater the landing speed. ....

.... 5. Clipped wings are for the purpose of decreasing the speed of the airplane. ....

.... 6. Lift decreases as altitude increases. ....

.... 7. Drag will increase as velocity of the airplane increases. ....

.... 8. Flutter is an oscillation of definite period but stable character set up in any part of an aircraft by a momentary disturbance. ....

.... 9. The formation of eddies in an air flow increases air resistance. ....

.... 10. When a glide is started at high altitude and the glide angle is kept the same, the speed of the airplane will continually increase as the plane gets closer to the ground. ....

KEY AND SUGGESTED SCORING

Part I (one point each)

1. F	9. F
2. F	10. T
3. T	11. F
4. T	12. T
5. T	13. T
6. F	14. T
7. F	15. T
8. F	

Part II (each blank worth three points)

1. *a*) Thrust
   b) Lift
   c) Drag
   d) Gravity
2. *a*) Roll
   b) Longitudinal
   c) Pitch
   d) Lateral
   e) Yaw
   f) Vertical

Part III (two points each)

1. c	6. f
2. h	7. g
3. d	8. j
4. a	9. l
5. b	10. e

Part IV (one point each)

1. b
2. c
3. a
4. c
5. b

Part V (three points each)

1. F, increases	6. T
2. F, decreases	7. T
3. F, greater	8. F, unstable
4. T	9. T
5. F, increase	10. F, decrease

Whether you are at the beach or the old swimmin' hole, before you dive into the water ask yourself three questions: Do you know that the water is deep enough and free of obstructions? Is there someone around who can help you if you have trouble? Has it been two hours since your last meal? — *National Safety Council.*

One out of every 13 persons in the United States suffered a disabling injury in 1946. — *National Safety Council.*

Problems and Projects

PEWTER CANDY DISH — A SPINNING PROJECT

HAROLD S. BEAL

East Rochester, N. Y.

In spinning the base of the candy dish a two-piece or plug chuck is used. This type of chuck can be used to advantage where the article to be made is smaller in the center section than it is at either end, and both ends can be open so the chuck can be withdrawn. The chuck is turned as illustrated in Figure 1, and the spinning operation carried on in the usual manner. After the metal is spun to the chuck the closed end is cut out with a diamond point, thus relieving the plug. The shell can then be removed, the chuck reassembled and another shell spun.

If only one piece is wanted, the shell can be spun over a one-piece chuck by first spinning the blank to a chuck turned as shown in Figure 2, then turning the chuck down as illustrated in Figure 3, and spinning the metal to the desired shape. This latter process can be used effectively when desiring a knob such as is pictured on the cigarette container. The solid lines in the drawing represent the chuck form and the dotted lines show the way the knob will look when completed. If a quantity of the covers are needed, two separate chucks will be required.

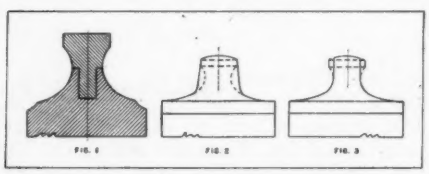


Fig. 1. Cross section of two-piece or plug chuck for base of candy fish. Figs. 2 and 3. Shape of chucks for spinning knob for top of cigarette container

The upper part of the candy dish, shown in Figures 4 and 5, is spun from a disk of 14-ga. pewter 7¼ in. in diameter and the base from a 15-ga. disk 3¾ in. in diameter. The two pieces are centered and soldered with a 60 per cent tin — 40 per cent lead soft solder, using muriatic acid and glycerine as a flux. The dish can be made more attractive by the addition of two handles cut from 14-ga. pewter and soldered to the rim.

The cigarette container shown in Figure 5 is made by spotting or hammering a piece of 20-ga. copper 2⅞ in. wide and 7¼ in. long. File the piece perfectly square, roll or form into a tube, bind together and silver solder the ends. The base is made of 16-ga. copper ¼ in. larger in diameter than the tube and soft soldered to the body. The cover is spun from a disk of 20-ga. copper 3¼ in. in diameter over wood chucks illustrated in Figures 2 and 3.

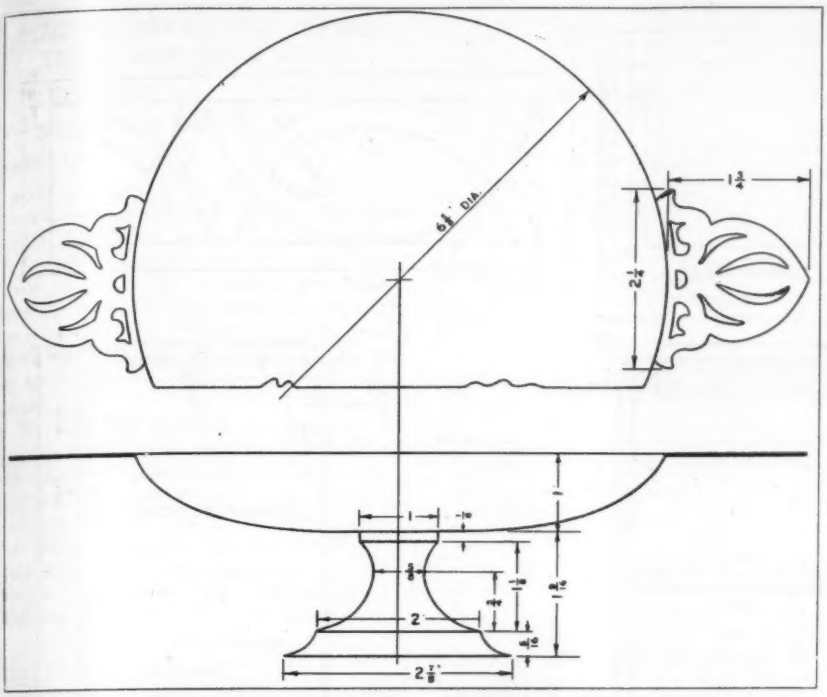


Fig. 4. Pewter candy dish with chuck dimensions

Fig. 5. Pewter dish and cigarette container

AN EIGHTEENTH-CENTURY BOOKCASE

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High School
Princeton, N. J.

Probably in no other era in the history of furniture making has man offered us so much in design, beauty, and utility, than have our master craftsmen of the late eighteenth century. The accomplishments of these men, our predecessors, have left with us the basic elements of good furniture designs that not only fit well in our cultural environment but which have become the best sellers in better furniture today.

The selection of projects to be made by our students in the shop is often the most difficult problem with which the instructor is confronted. The need for a variety of hand tool and machine processes is unquestionably important if we are to make our instruction practical and worth while. As a result, we have become guilty of using the same group of projects year after year — projects that very often disregard quality of design. The choice of furniture of good design should become as important to the craftsman as careful and exacting construction.

The eighteenth-century bookcase shown in this article was designed to fit the needs of high school students. Its construction is not difficult, and it may be built by the comparative novice with ease, yet its construction includes several types of joints: the mortise-and-tenon, groove, butt, dado, and the dowel point. It further offers experience in many hand tool and machine operations as well as in carving and finishing.

BILL OF MATERIAL

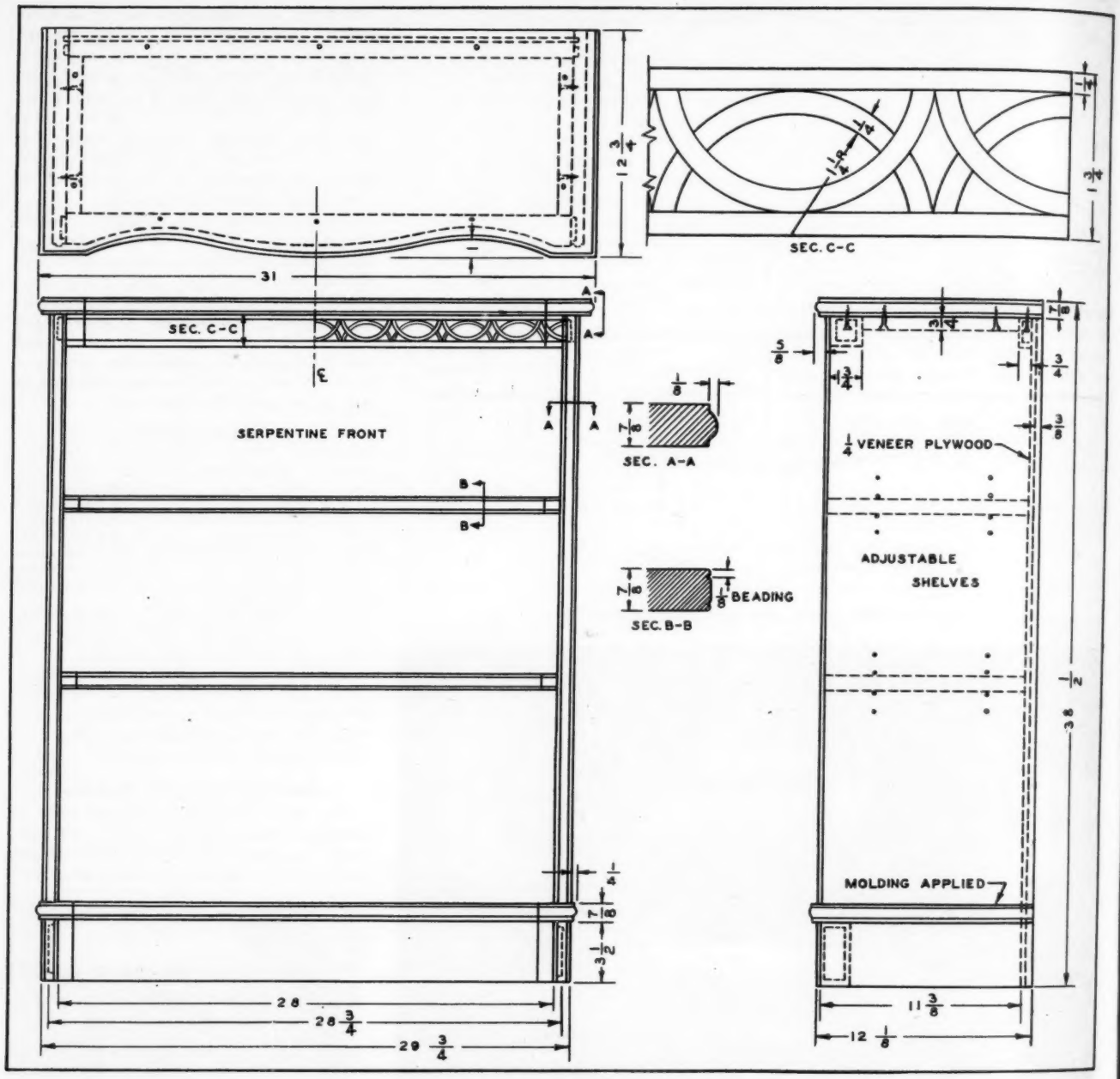
No. of pieces	*Name of part*	*Size*
2	Sides	⅞ x 12⅛ x 37⅝
1	Top	⅞ x 12¾ x 31
2	Adjustable shelves	⅞ x 11⅜ x 28
1	Bottom shelf	⅞ x 11¾ x 28¾
1	Caryed front apron	1¾ x 1¾ x 28¾
1	Bottom apron	1¾ x 3½ x 28¾
1	Top brace	¾ x 1¾ x 28¾
1	Rear panel (Veneer plywood)	¼ x 28¾ x 37⅝
2	Applied molding	¼ x ⅞ x 12⅜
8	¼-in. adjustable shelf supports	

This bookcase should be made of a hardwood such as cherry, walnut, or mahogany. If these woods are not available, a softer wood can be substituted and finished to represent a distinguished hardwood piece.

Construction of the Bookcase

To begin construction, obtain stock of rough dimensions for the sides of the bookcase. If necessary, join several boards together using a butt or dowel point and a good grade

18th-century bookcase



An eighteenth-century serpentine-front bookcase

of glue. True the surfaces and cut to exact dimensions.

The top, shelves, and aprons are made with a serpentine front, therefore, first make a template on heavy paper or plywood following the dimensions given in the details of the bookcase. Cut these pieces to the finished sizes called for. Since the top apron is to be carved, care should be taken to select straight-grained stock, 1¾ in. thick and long enough to allow for the tenons. Both aprons and the top brace are fitted with blind mortise-and-tenon joints. These joints should be made and fitted before the carving is begun. The bottom shelf is dadoed in place to a depth of ¼ in. while the back veneer plywood panel is grooved into the sides. The two center shelves are adjustable and held in place with shelf supports.

The carving of the top shelf is probably the most difficult task for the novice, but a few pertinent instructions will simplify his work. A template should be made to scale — see Detail — Section CC. Starting from the center of the apron, lay out the pattern, working toward each end. Clamp the stock in a vise and with a sharp tool first cut into the stock, along the lines of the design, and then remove the excess wood, working toward the cuts. It should be remembered that the wood carver always keeps his hands behind the tool and works away from himself to avoid accidental stabbing. Very little sanding should be necessary as it is not intended to destroy the hand-carved appearance.

Before assembling this project, shape the front edges of all shelves and sides (see Details -- Sections AA and BB). These edges can be made with one or a combination of standard shaper cutters.

Remember to always make a trial assembly of a project before applying glue. Little needs to be said about sanding and finishing, only thorough and complete sanding and careful finishing can insure a good project.

BENDING DEVICE FOR METAL STRIPS AND BAND IRON

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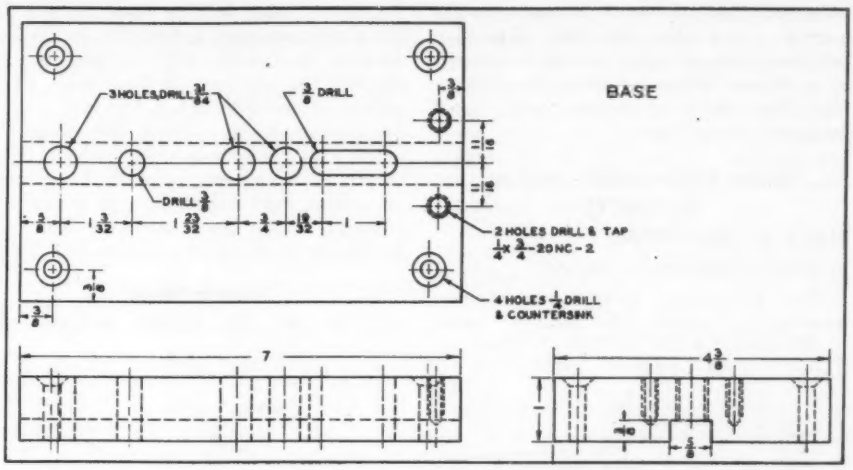
This bending device provides a good method for bending metal strips and band iron 1/16 by 1 in., up to ¼ by 1 in. Also ¼ in. round and square stock, to a minimum radius of ½ in. up to almost any radius required. With a little manipulation irregular curves, scrolls, and intricate shapes also can be formed. Strips ranging from several inches to several feet can be manually bent with accuracy.

The base may be made of cast iron or machine steel. The various size posts permit the making of curves of different size radius. The posts are made of cold rolled steel, case hardened. If it is found that a larger bending device to handle heavier material is desired the dimensions given may be increased in proportion. The sliding post is equivalent to a vise which will hold various sizes of material. The adjusting screw and winged nut hold the sliding post in position.



Bending device

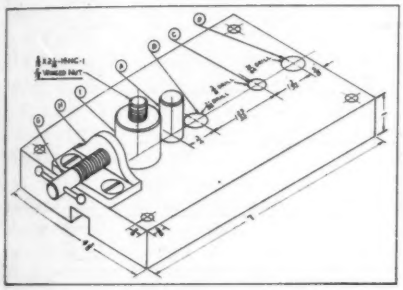
The eccentric post also becomes a clamp for various thicknesses, and it is used to make quick adjustments in forming irregular curves and scrolls.

The adjustment brace *H* and adjustment screw *G* will permit fine adjustment to be made so that sliding post *I*, piece *I* will have a vise holding effect on the material that is to be bent around posts placed at *A* or *B*.

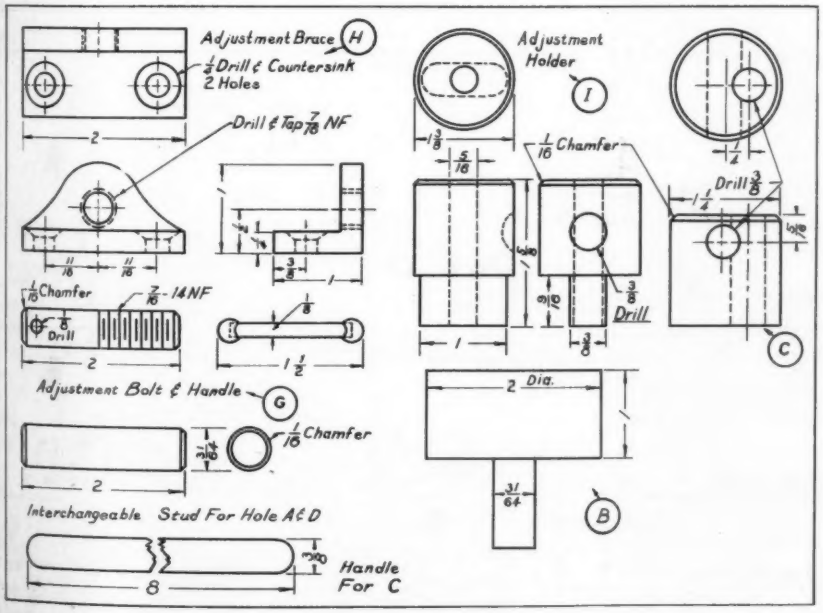
The purpose of posts *A* and *B* is to vary the size of the radius. With *I* tightened in place it also becomes a different size post for radius in bending irregular curves.

By loosening winged nut on *I* and using adjustment screw *G* the piece being bent may be allowed to pass between the sliding post *I* and post *A* or *B*, allowing long continuous irregular curves.

This bending device has been in use for some time and has been found very satisfactory.



Assembly of bending device



Details of bending device

SURFACING SMALL STOCK

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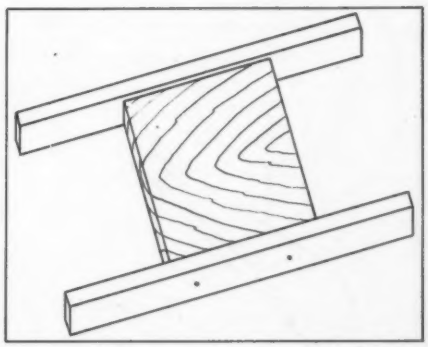
It is sometimes necessary to surface stock which is too small for safe surfacing on the power jointer. This is often the case with small blocks for faceplate turning which are to be jointed for face to face gluing.

One convenient method of solving this problem is to cut two lengths of scrap stock about ¼ in. wider than the rough stock to be surfaced, and long enough to be safely run over the jointer or through the surfacer. Nail one strip to each side of the rough stock, being sure they are parallel to each other. They should extend beyond the edges of the rough stock in both thickness and length dimensions.

The stock can then be jointed. Take sufficient cuts to smooth the first face. Now, because the auxiliary strips are of the same



Method for surfacing small stock

width and parallel and have been equally jointed on one edge, the entire piece may be turned over and either jointed or surfaced in a thickness planer to the required thickness. The method works fine, and is used frequently in my shop.

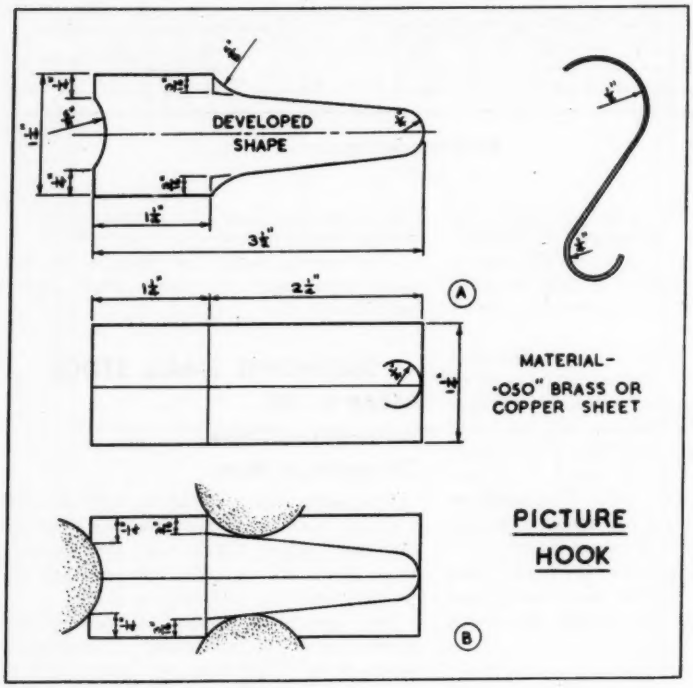
FOUR BEGINNERS' METAL PROJECTS

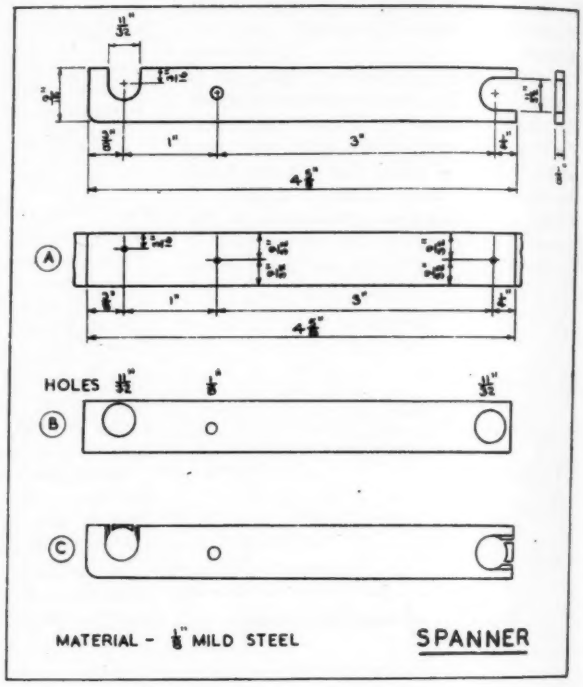
PERCY W. BLANDFORD
Willesden, Middlesex, England

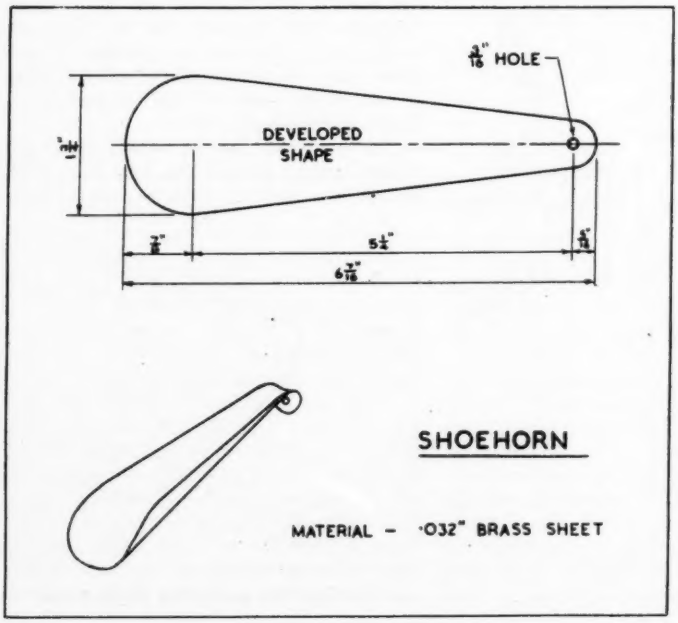
These four projects are used as introductory exercises for students aged about 11 years; the object being to give them practice in the simple processes and in the use of the common hand tools, with, in the case of the bolt, the first steps in lathe work. Each student is provided with a blueprint, carrying drawings similar to those illustrating this article, and step-by-step instructions. The teacher is thereby relieved of much mechanical routine work and is able to devote his attention to the more important duties of instructing in technique and correcting faults.

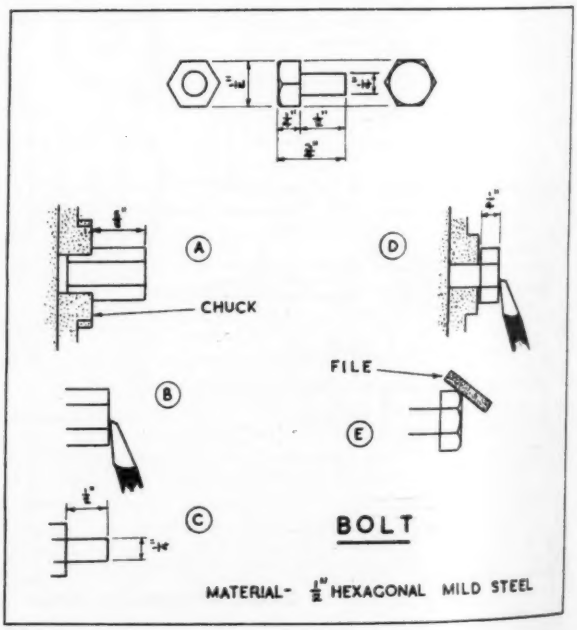
Picture Hook

1. File one edge straight, and one end at right angles to it, drawfiling both edges.
2. Mark out length and width with rule and scriber, shear off waste and file down to lines.
3. With a pencil mark out the two lines shown and draw the arc with a compass (sketch A).
4. Complete marking out with a scriber, using a coin or metal disk (1¼-in. diameter) to draw the arcs (sketch B).
5. Shear off waste metal and file to shape. Round all edges with file and emery cloth.
6. Polish bright all over.
7. Bend ends to shape with mallet, using 1-in. and ½-in. diameter rods as stakes.









Spanner

1. File one edge straight, then mark out width and file down to size.
2. Mark out length, and positions of holes (sketch A).
3. Center-punch and drill the holes (sketch B).
4. Mark out the sides of the slots, making them tangent to the sides of the holes.
5. Saw down the sides of the slots, keeping the saw on the waste side of the lines. Have the bottom of the hole below the top of the vise to avoid having the saw damage the curve as it breaks through, and cover the vise jaws with clamps to prevent damage to the saw teeth. Saw and file to length. Round off corner (sketch C).
6. File slots to size.
7. File surfaces bright and polish with emery cloth.

Shoehorn

1. On the material supplied, draw a center line in pencil.
2. Near one end draw an arc 7/8-in. radius. From its center measure 5¼ in. along the center line and draw another arc 5/16-in. radius. Join the two arcs by tangents, drawn with a scriber.
3. Cut out with tinsnips and file to shape.
4. Thoroughly round all edges with file and emery cloth.
5. Center-punch and drill hole, as shown.
6. Anneal by heating to red heat and cooling. Clean in acid bath.
7. Bend to shape over beakiron, using a mallet. Test curve on your own shoe. Carry the curve the whole length of the metal to provide stiffness. Bend the small end over a ½-in. diameter rod.
8. Planish all over with a curved peen planishing hammer.
9. Polish on polishing mop.

Bolt

NOTE. All of the turning is done with a right-hand knife tool.

1. Cut a piece of ½ in. hexagonal mild steel bar, 7/8 in. long.
2. Fix the metal in the self-centering chuck, with about 5/8 in. projecting (sketch A).
3. Square off end (sketch B).
4. Turn down to ¼-in. diameter for a distance of ½ in. Use a ¼-in. hole in a piece of sheet metal as a gauge (sketch C).
5. Reverse the bar in the chuck, and turn bolthead to thickness (sketch D).
6. While the bolt is revolving, put the small bevel on the head by a few strokes of a hand file held at about 45 deg. (sketch E).
7. Remove the bolt from the lathe and cut the thread with a die.

DARNING EGG DE LUXE

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Bassett Junior High School
New Haven, Conn.

This novel project is designed to hold darning cotton in one part of the egg with an opening at the end for an assortment of needles.

For those who are not familiar with the services this device offers to an industrious woman, I shall attempt to explain. Most women have an assortment of cotton for making repairs to the lowly sock. The egg is inserted in the top and pushed to the area that needs attention and the material is drawn taut over the large part of the egg enabling a woman to make even and accurate stitches. It really is a help and is something many women would not be without.

As a wood-turning project this de luxe egg offers excellent opportunities for a student to test his skill. Many basic turning operations are involved in the project shown. Extreme accuracy with most of the steps of construction is necessary if he expects the parts to fit well. If the parts fit together loosely, the egg will not stay together. Any kind of wood may be used such as pine, whitewood, gum, etc.

It will be noted that the detailed turning instructions refer to the parts as A, B, and C. These are lettered on the drawing as an aid.

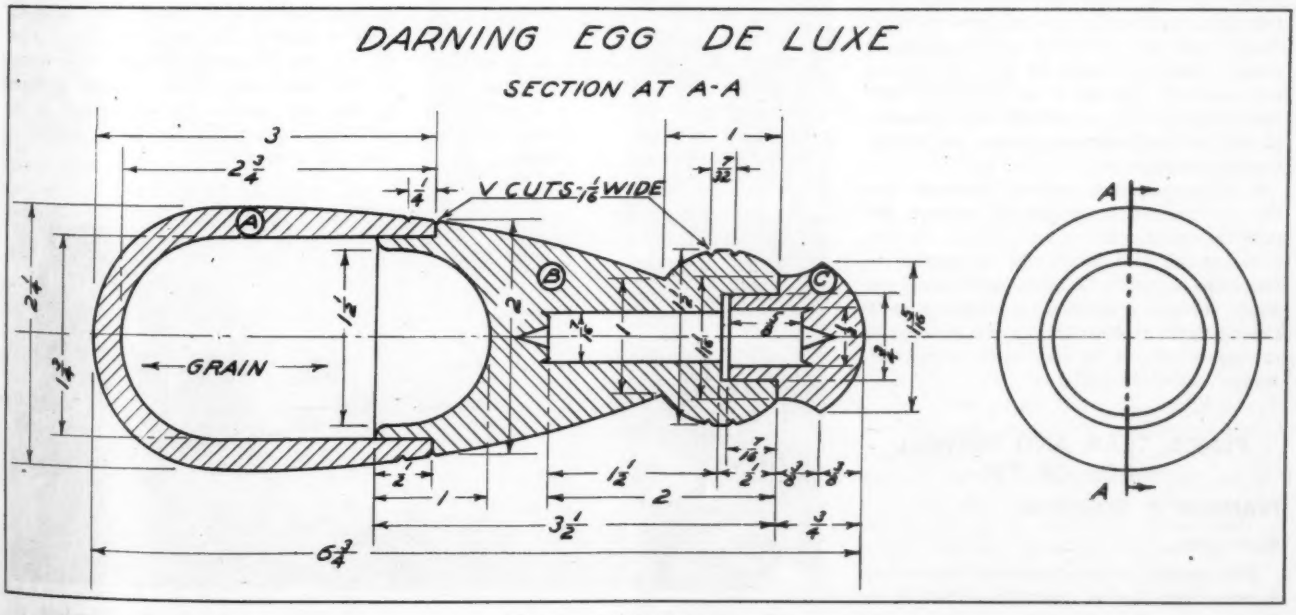
Detailed Instructions for Turning the Darning Egg

Part A:

1. Cut a rough piece of wood 3½ in. long. This is ½ in. longer than the dimension on the drawing. Note direction of the grain.
2. Mount between centers on the lathe and turn to approximately 2⅜ in. in diameter. Leave the piece fairly smooth, but do not sand. Both ends must be the same diameter, and not tapered.
3. Face off both ends square while it is spinning in the lathe.
4. Remove from the lathe and bore a 1-in. hole, 2 in. deep. This makes it easier to hollow the egg. Bore the hole into the end that the *live* center was on.
5. Screw a piece of 1⅝-in. thick stock to the faceplate and hollow out until part *A* can be chucked tightly in it. Tap in securely with mallet.
6. Hollow out part *A* according to dimensions on drawing.
7. Wrap a piece of sandpaper around a finger and sand the inside completely. Remove from chuck but save chuck for part *B*.

Part B:

1. Cut wood to exact dimensions as called for on the drawing.



Details of darning egg

2. Center in the lathe and turn round so that it will chuck in the same jig used for part *A*. When chucking have the marks of the *live* center out because this is the end that will be hollowed first.

3. Turn face end of cylinder square. Mark diameter of opening on end of cylinder and turn out to proper dimensions as shown. Sand completely inside.

4. Remove from chuck. Reverse ends and rechuck.

5. Face end square and then locate exact center while lathe is turning.

6. Remove from lathe and bore the 7/16-in. hole in the end exactly 2 in. deep as shown on the drawing. This may be done with a bit and brace.

7. Place chuck on lathe and turn opening for part *C* as shown.

Part C:

1. Cut wood 1¾ by 1¾ by 2 in.

2. Place between centers of lathe and rough turn it.

3. Face off the end of the cylinder which is in the dead center.

4. Working from the same end, turn down until it is a push fit in the bored hole of part *B*. Part *B* and *C* should meet with practically an invisible joint.

5. Bore a ½-in. hole into part *C* as shown on the drawing. The reason for using this size hole is to prevent the needles from catching on the end as it is being inserted. Note that the hole in the end of part *B* is smaller than that in part *C*.

Assembling:

1. Remove part *B* from the chuck and reverse ends, turning part *B* until it is a push fit in part *A*. Extreme care must be used in this operation being certain that part *B* is perfectly centered in the chuck before starting to turn.

2. Remove from the chuck and fit all three pieces together. Place between centers (the ends are already centered from previous operations) and turn outside of entire project to shape. Great care must be used in turning the outside of the egg so as not to cut into the joint of part *A* and *B*. All diameters should be found with the parting tool before starting to shape.

3. Sand completely while in the lathe and then cut in the V designs to improve the over-all appearance.

4. Any kind of finish may be applied to the outside. It may be advisable to leave the inside surfaces unfinished. If shellac is used there may be trouble later trying to separate the parts as shellac tends to stick with various climatic conditions.

PENCIL TRAY AND INKWELL MADE OF TIN

FRANKLIN H. GOTTSHALL

Boyertown, Pa.

This project is recommended for its boy appeal. Boys like to make things to put on their writing desks. They like them in bright colors, and so this project, and three more which are to follow, all have simple designs which may be worked out on the project, either in the shop or in the art class. While the square little boxes are intended as inkwells, they may be used to hold other things instead.

MATERIALS REQUIRED

One box, tin, 5¾ by 11¼ in.
Two trays, tin, 3¼ by 9⅛ in.
Two inkwells, tin, 6⅜ by 6½ in.
Two inkwell lids, tin, 2 13/16 by 2 15/16 in.
Two pieces 14 ga. galvanized wire, 2 in. long.
Solder-colored enamels.

Procedure

1. Use tin cut from large, gallon-sized cans. Clean the cans as soon as their contents have been removed.

2. Salvage the tin as shown and explained under Figure 1. (See drawing on page 207.)

3. Make patterns on stiff drawing paper of the pieces shown in Figures 2, 3, 4, and 5. Transfer these patterns to the tin with a sharp scriber.

4. Cut the tin to shape with a pair of snips.

5. To make the box, first turn the ⅛-in. single hem on each edge. If a bar folder is available, it should be used for the purpose. If not, then turn the hems over the edge of a hatchet stake, or square-edged board to form the angle, and then finally finish turning it over with a mallet on top of a surface plate or anvil. Next, bend the long sides to form right angles with the bottom of the box, either as shown in Figure 6, in a bar folder, or over the squared edge of a board held in a vise. Bend the ends in the manner shown in Figure 7. With flat-nosed pliers, bend the laps for soldering, and then solder all joints.

6. To make the curved-bottom trays shown in Figure 8, first make a paper pattern, then transfer the shape to the tin with a sharp scriber.

7. Turn the single hem on all edges as was done on the box.

8. Curve the bottom over a piece of pipe, or a mandrel about 1 in. in diameter, held at one end in a vise. Curve it to fit the curve shown in Figure 3 before attempting to solder it to the ends. See Figure 8.

9. Bend up the sides as was done with those on the box. Turn the flaps and solder the joints.

10. To make the inkwells, first make paper patterns and transfer them to the tin as was done with the former pieces. The inkwells are most easily formed over a block of wood cut to the size of the inside of the wells. The same block may also be used to form the lids. Turn the flaps and solder the joints. Test the inkwells by filling them with water to see that they do not leak.

11. Cut pieces of wire 2-in. long. Hold a wire against the 7/16-in. flaps of the box which are to form that part of the hinge, and with a pair of flat-nosed pliers bend the flaps around the wire.

12. Remove the wire from the box, and proceeding in the same manner, bend the flap on the lid around the wire.

13. Place the lid in position on the box and slip the wire into place to form the hinge. See Figure 9.

GOOD CASTINGS FROM SCRAP ALUMINUM

HAROLD VAHUE

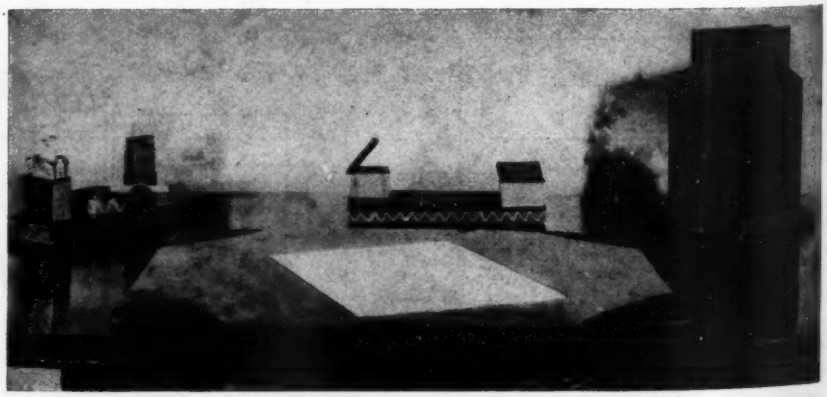
Central School

Sherburne, N. Y.

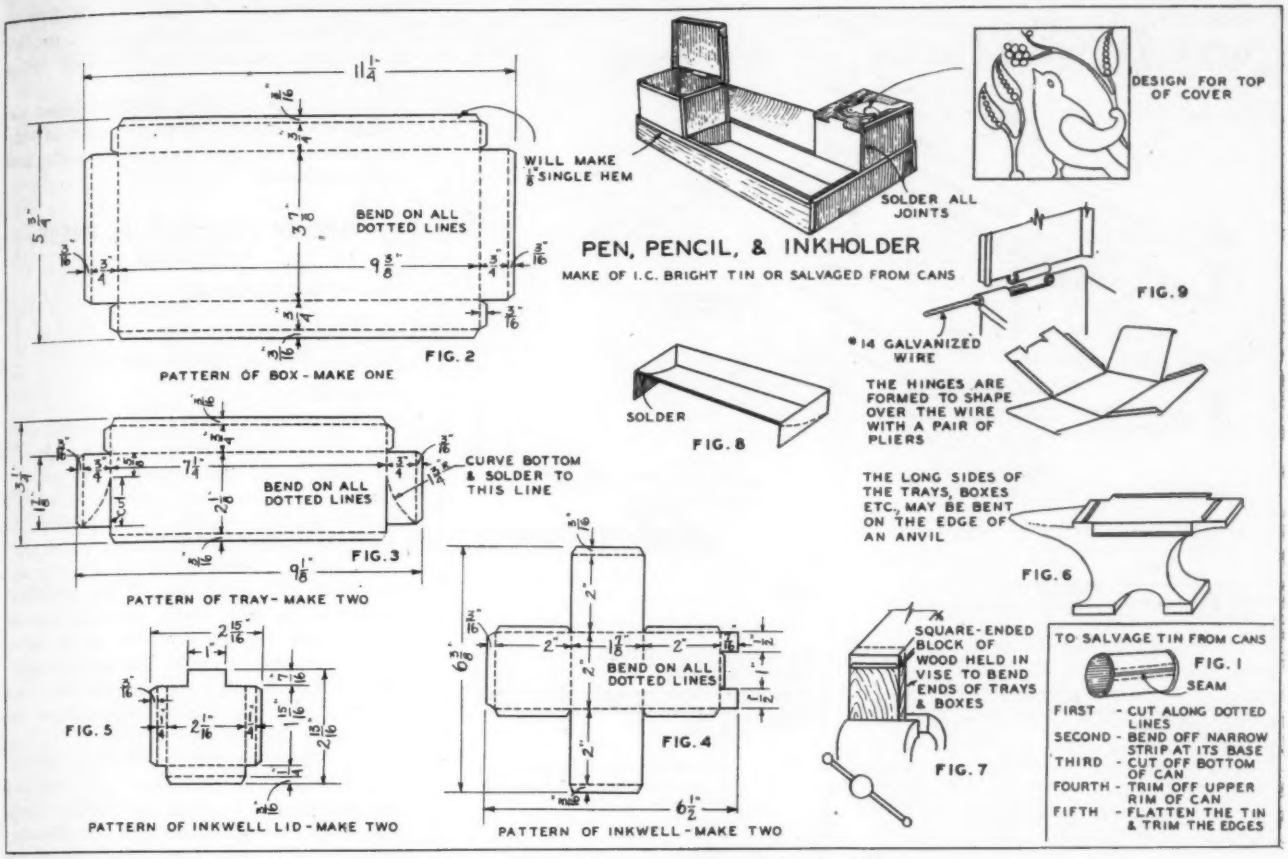
We had a large supply of war surplus aluminum and other metal from scrap airplane parts on hand. When my students tried this metal for casting, the resulting projects were so full of flaws that they had to be discarded.

We then discovered that by adding one tablespoon of the flux used for welding cast aluminum, the scrap would become chemically clean and produce very good castings that could be machined quite easily in our machine shop.

The flux is merely added to a small crucible of metal before it is heated. Then when the metal is melted, the impurities are skimmed off, and the aluminum is ready to be poured in the usual way. Clean castings produced in this way justify the expenditure of the additional outlay for the small amount of flux that is required.



The inkwells have been turned around in this photo to better show the lids


PEN, PENCIL, & INKHOLDER
MAKE OF I.C. BRIGHT TIN OR SALVAGED FROM CANS
WILL MAKE 1/8" SINGLE HEM
SOLDER ALL JOINTS
DESIGN FOR TOP OF COVER
BEND ON ALL DOTTED LINES
PATTERN OF BOX - MAKE ONE
FIG. 2
FIG. 9
#14 GALVANIZED WIRE
THE HINGES ARE FORMED TO SHAPE OVER THE WIRE WITH A PAIR OF PLIERS
SOLDER
FIG. 8
CURVE BOTTOM & SOLDER TO THIS LINE
BEND ON ALL DOTTED LINES
PATTERN OF TRAY - MAKE TWO
FIG. 3
THE LONG SIDES OF THE TRAYS, BOXES ETC., MAY BE BENT ON THE EDGE OF AN ANVIL
FIG. 6
SQUARE-ENDED BLOCK OF WOOD HELD IN VISE TO BEND ENDS OF TRAYS & BOXES
FIG. 7
TO SALVAGE TIN FROM CANS
FIG. 1
SEAM
FIRST - CUT ALONG DOTTED LINES
SECOND - BEND OFF NARROW STRIP AT ITS BASE
THIRD - CUT OFF BOTTOM OF CAN
FOURTH - TRIM OFF UPPER RIM OF CAN
FIFTH - FLATTEN THE TIN & TRIM THE EDGES
FIG. 5
PATTERN OF INKWELL LID - MAKE TWO
BEND ON ALL DOTTED LINES
FIG. 4
PATTERN OF INKWELL - MAKE TWO

Details of holder for pen, pencil, and inkwells

BAND-SAW GUARD

G. HAROLD BILLINGHAM

Weehawken, N. J.

The actual cutting area of band-saw blades is not guarded and this offers a possible hazard when the blade is slowing down after use.

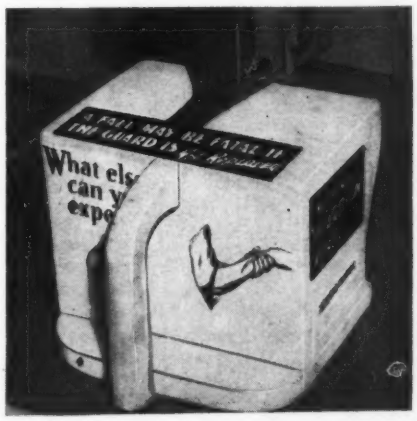
Operators seldom wait for the machine to stop, walking away, leaving the blade in motion. This is a cue for other students to run pieces of wood against the teeth, or at least loiter in the danger zone.

To offset this condition, and at the same time practice safety with visual aids — the silent teachers — we made a guard of wood, glued together, having no nails or screws, that fits the throat area, covers the blade and part of the movable guard. The latter acts as a stop, and the base is designed so that it does not contact the teeth.

It is approximately 8 in. long, 6 in. high, and 9 in. wide, for our 30-in. wheel model. A handle is attached to the rear for ease of handling. All corners and edges are rounded.

The entire job was painted gray, and safety poster cutouts were cemented to the side surfaces.

A shelf was built on the wall near by to hold the guard when the band saw is in use.



Band-saw guard

This is a valuable contribution to the project as otherwise the removal of the gadget might create a storage problem.

This safety guard also is a reminder to the operator that operating a band saw is a hazardous operation.

Devices of this kind make it unnecessary for the instructor to remind his students continually of safe practices, and thus increase class morale.

GRASS CUTTER USING DISCARDED RAZOR BLADES

R. E. MURRAY

Co-ordinator

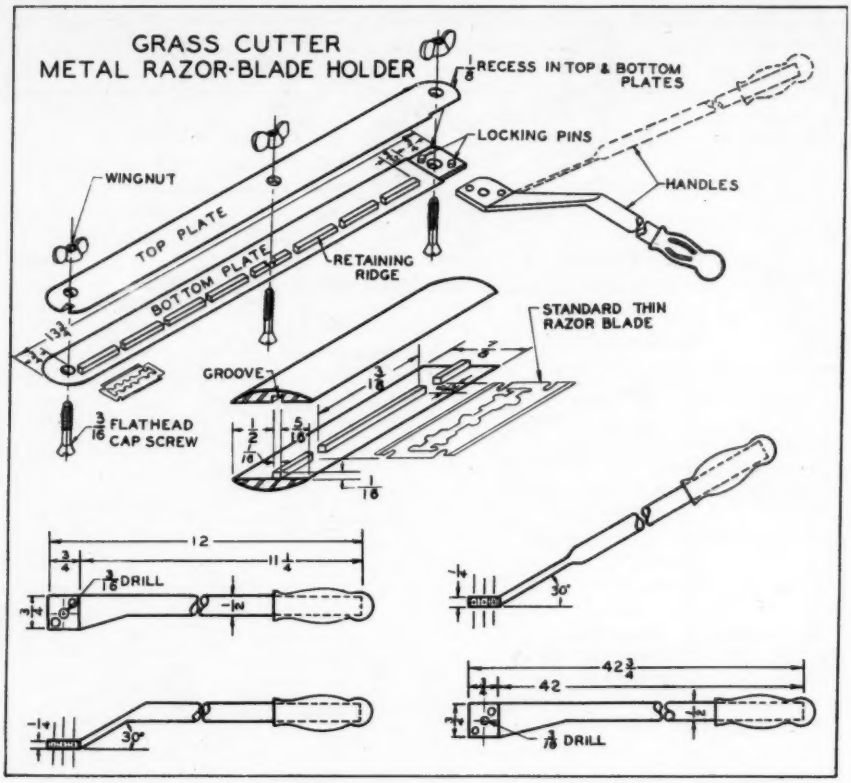
Public Schools

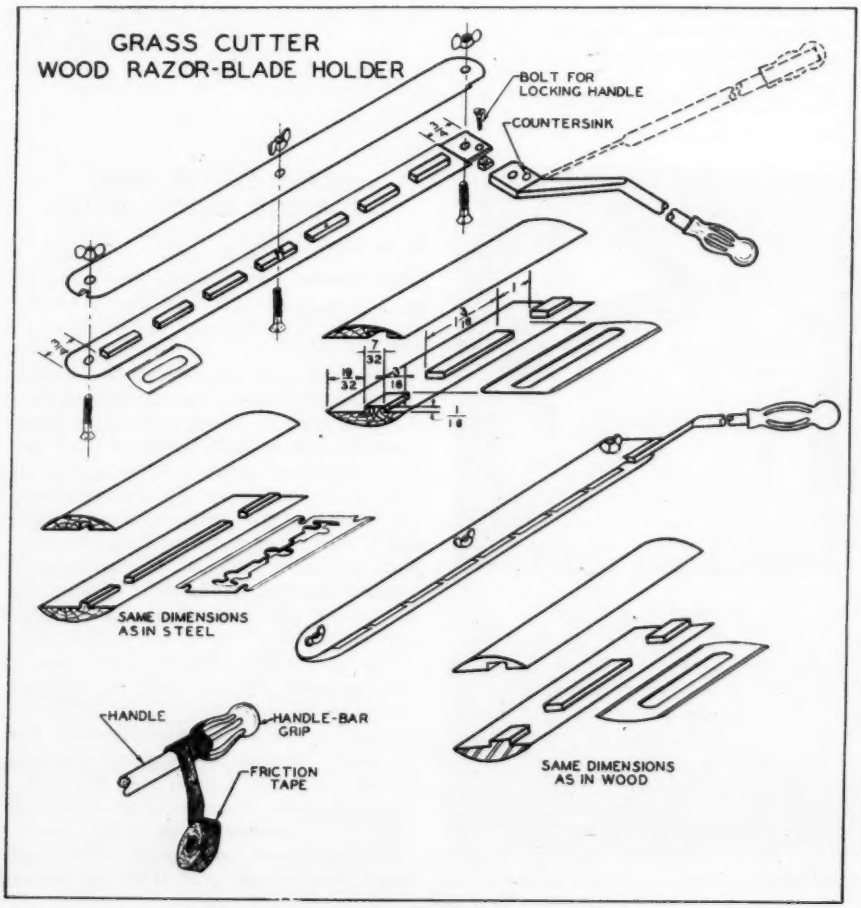
Fremont, Ohio

There are several types of effective grass cutters, which can be made at little expense, using discarded razor blades. The cutter holder may be made of wood, steel, or band iron. The wooden one requires only slight knowledge of machine tools. The retaining ridge can either be cut by hand or on a table saw. These ridges should be slightly narrower than the slot in the razor blade to insure ease of insertion and removal. The groove, in the top plate, can be cut in the same manner.

The metal cutter holder can be made of steel or band iron of a suitable thickness. The retaining ridge and groove in the top plate can be cut by means of a bench shaper. Curvature on both top and bottom plates can be ground or filed to give the blade a better clearance. Holes for clamp-down bolts should be countersunk in the bottom plate.

The handles for both cutters can be made from ½-in. tubing, flattened on one end and





Grass cutter using discarded razor blades

bent to the indicated angles. Either type of handle may be used interchangeably, one for a crouching position, and the other for a standing one.

Friction tape is tightly wrapped around the tubing and a bicycle handle-bar grip is then slipped over it. The tape prevents the grip from coming off.

GROUP PROJECT IN PRESS TOOLING

JAMES W. McINTYRE

Machine Shop Instructor

Reading Senior High School

Reading, Pa.

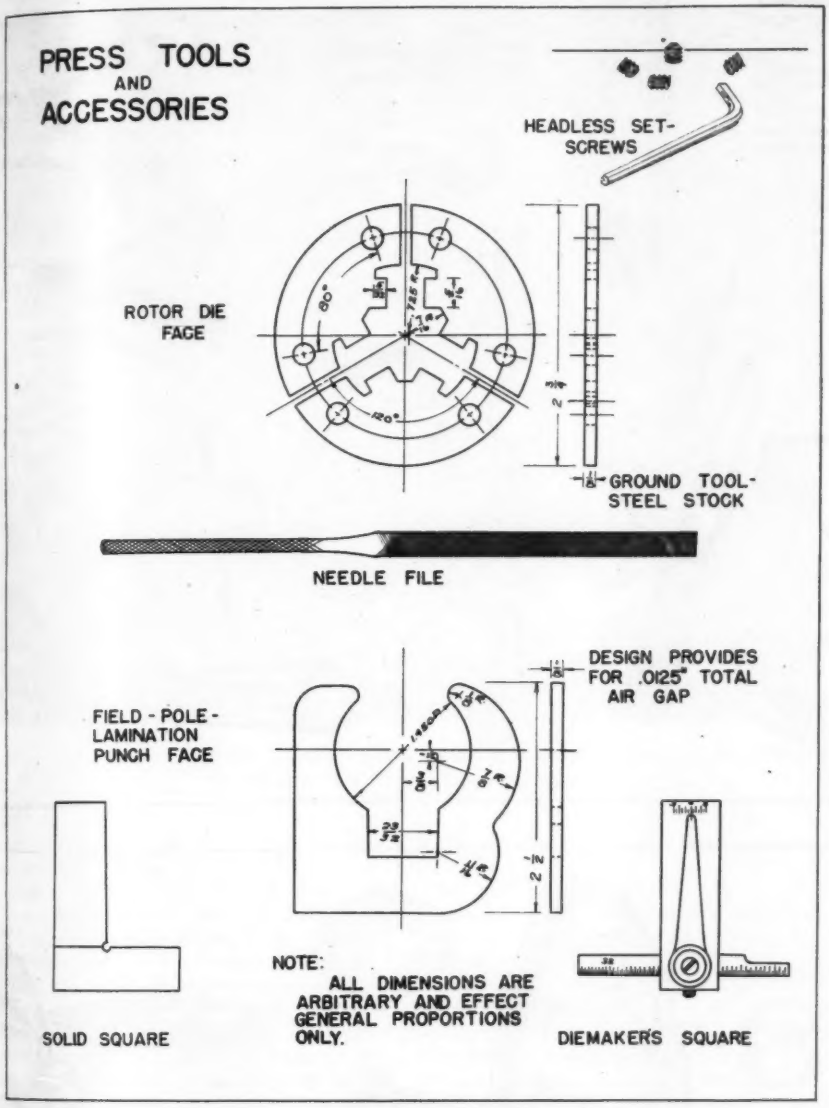
A section of 24 advanced vocational boys who have shown interest in die work and are ready to try their hand at a live job may represent the necessary student talent for completing this project. Ready implies that this group is familiar with machine tool operation and is capable of superior layout and benchwork. A valid test of the individual ability to file is a nearly infallible measure of readiness for die work, as far as bench performance is concerned. This is true regardless of the fact that the reciprocating filing machine must usually be depended on for squareness or clearance angles.

The job in question involves the piercing and blanking of the rotor and field-pole laminations for a 6-volt d.c. series motor. The blanks are distributed later to industrial-arts electric shops where assembly of the motor is carried out.

The shearing surfaces of the punch and die are made of a good grade of commercial ⅛-in. ground stock. They are attached to and reinforced by a machine steel holder which has a profile similar to the shearing tool except for an all-round clearance of about 1/32. Use of such a ⅛-in. tool-steel face minimizes the task of working the punch and die to the required dimensions and simplifies heat-treatment. Since a long production run is not expected of the die, and the stock is soft, 1/32-in. black iron, this design will prove entirely adequate.

A simple progressive die can be designed for the rotor. This means that two operations are carried on in a single press stroke. In this case the hole in the center of the rotor would be pierced just as the stock was fed into the press. It is critically important that elements of the punch and die walls be parallel with the center line of the punch stroke. If the slugs bind due to negative clearance angle in the die, it will soon crack and be useless. Or if the die is subject to repeated impact from a punch which enters freely but bears against the die walls even slightly at the lower stroke extreme, early die failure can again be anticipated.

The life of the press tools in this project is represented by the approximate 3/64 in. which may be ground off the face in increments of 3 to 5 thousandths for sharpening. The soft iron stock of which the blanks are



Press tools and accessories

made will not induce excessive wear. A clearance angle of 1 deg. can start at the holders and be continued for about ½ in. So that the hole will appear concentric with the interrupted circumference of the finished blank an acorn pilot in the center of the rotor punch will position the stock under the punch.

The punch is made first in this type of job so that, hardened and ground, it may be used to shave in the die which is still soft. The die is filed to within .003 in. of the layout and then subjected to careful interference with the punch. For this operation, a screw press is necessary. A sharp punch, positioned correctly over a soft die will shear a .003 excess of die wall under a moderate press. It remains to file and stone in the die wall with an all-round clearance, in this case of .001 in.

The die is constructed in three identical parts for three reasons. Heat-treatment is simplified, open machining is possible, and a failure of any kind requires that only 1/3 of the die be replaced. It is also possible to adjust this die to a smaller blank size by grinding a few thousandths off the radial sides of the layout.

Careful attention to layout should precede any alteration to the surface of the ground stock. The scriber should be stoned, a layout dye and magnifying glass should be used, and the lightest of pin punch marks should outline the layout at regular intervals of about 1/16 in. when the pattern is complete.

The press tools made in this project may be used with the lever punch, the foot press, or the power press. It is a good idea to have two or even three sets of punches and dies assigned if one set is required so that the most accurate one may be selected and used. The more competent boys may make the dies. The less capable students may make the holders, adapters, or stripping plates. There is a contribution for everyone in the class to consider.

The following list suggests how assignments might be given to 2 boys:

1. Rotor die
2. Rotor punch
3. Field pole die
4. Field pole punch
5. Rotor stripping plate
6. Field pole stripping plate
7. Rotor punch holder
8. Field pole punch holder
9. Rotor die adapter
10. Field pole die adapter
11. Die shoes
12. Screws, nuts, clamps, etc.

INDIAN SILVERSMITHING

BEN HUNT

Hales Corners, Wis.

(Continued from page 169 of the April, 1948, issue)

Squash Blossom Necklaces

One of the most attractive pieces of jewelry made by the Indians is the squash blossom necklace. It is controversial whether the so-called blossom has been taken from the sunflower, the pomegranate, or the squash. For present purposes it is just as well to call it by its old name — the squash blossom.

There are three separate parts to these necklaces — the beads, the squash blossoms, and the pendant. The Navahos usually make their necklaces rather plain with perhaps a turquoise or two set in the pendant, while the Zuni use more turquoise decoration and make their squash blossoms much more elaborately. The one shown in Figure 3 on page 344 of the October, 1947, issue of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION is a fine example of Zuni work. Since good turquoise is always rather expensive, this article dwells mostly on the plainer types.

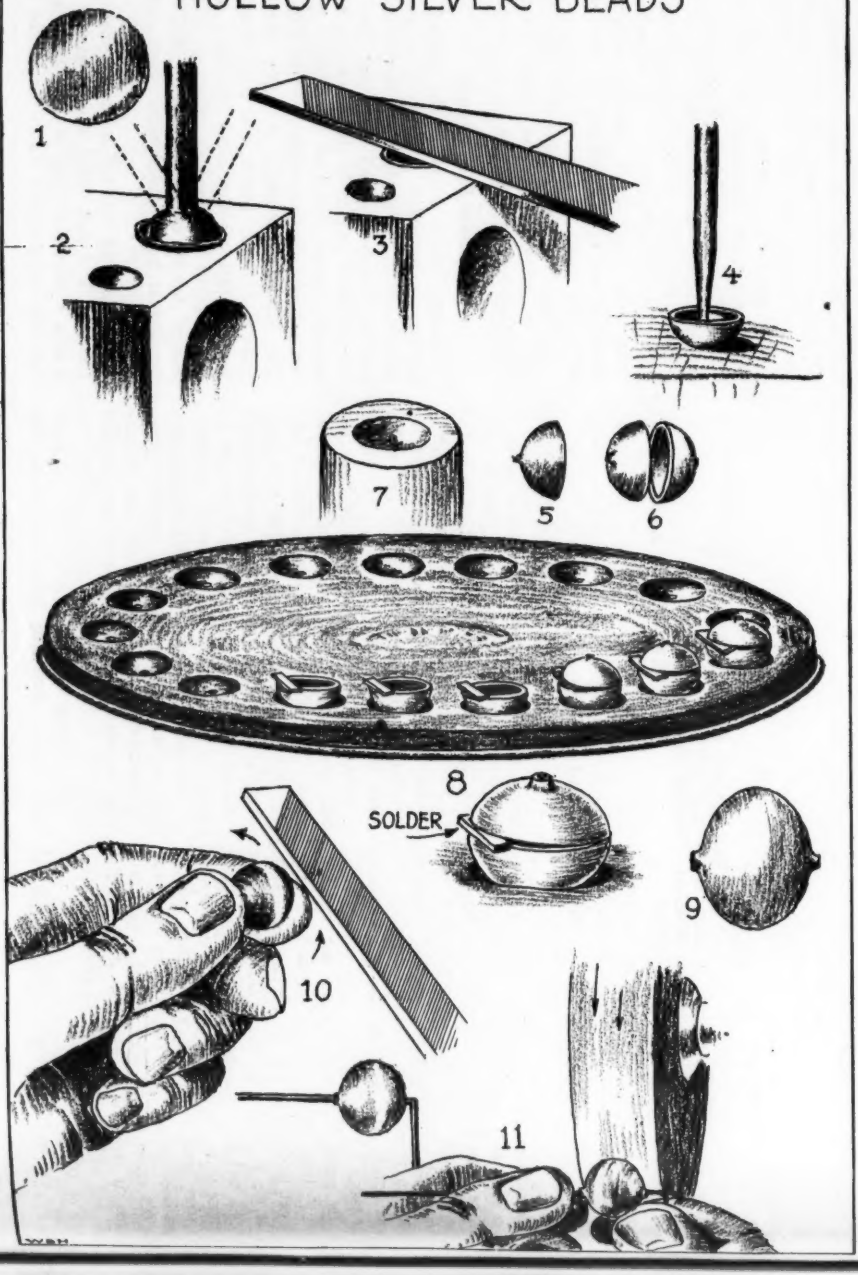
Making these necklaces really taxes one's skill, and it probably is best to start out with describing how to make the hollow beads.

Hollow Silver Beads

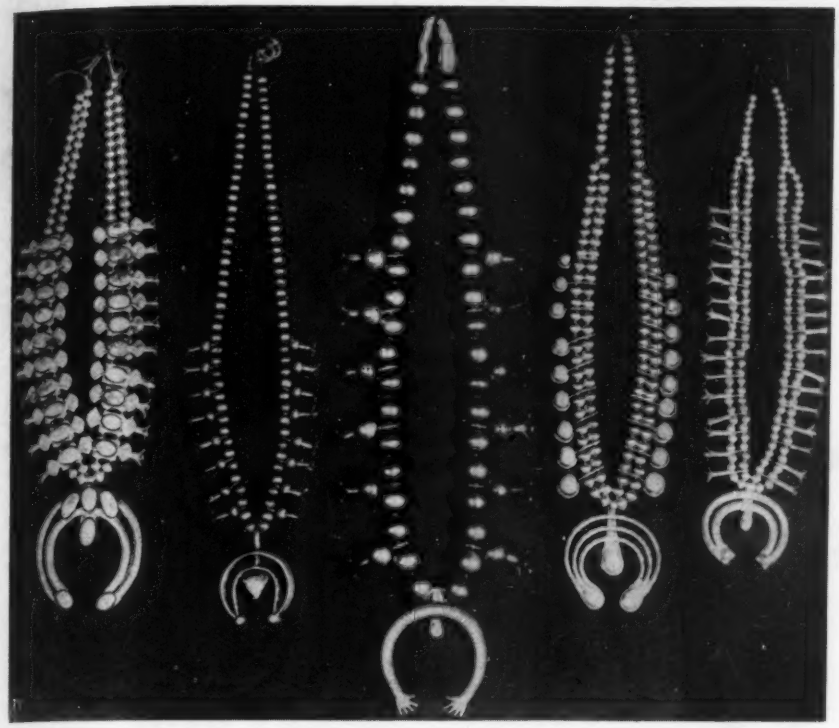
Making hollow beads by the method described in this article is relatively simple. A close study of the beads shown in the accompanying illustrations will show that they are not perfectly round. If the beads are made perfectly round they look like factory beads and not like those produced by the Indians. The Indian silversmiths evidently tried to make the beads round, but since most or probably all of the older necklaces were stamped out with wooden dies, it is only natural that the beads were not round. To get the Indian beads, then, make them slightly flat.

The steps in making beads are shown in Plate 22. Use thin silver, say 24 gauge. Cut a disk as shown at 1, Plate 22, a little larger than the size required. Beads run all the way

HOLLOW SILVER BEADS



SQUASH BLOSSOMS



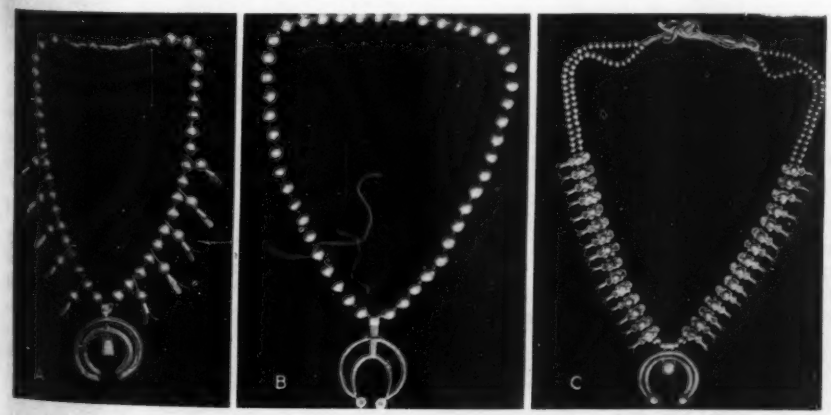
A variety of squash blossom necklaces from the collection of Buck Burshears. The one on the left is Zuni

from 3/16 in. to 5/16 in. in diameter. Try one first to determine how much larger to cut the disk. After stamping it out on a wood block or on a dapping die, as shown at 2, Plate 22, file the edges even as shown at 3, Plate 22, and punch a hole in the center of each half. At 4, Plate 22, is shown how to punch the center hole, and filing off the rough ends after punching is shown at 5. Do not file the protruding metal down to the bead proper, however, but leave a little of it stand, as shown at 6, Plate 22. Ream out the hole to prevent its cutting the cord. When a number of half beads are finished, match them up in pairs as the different halves will vary slightly in diameter.

To facilitate the soldering, take a cover from a half gallon can, such as a syrup can, and punch depressions in it as shown at 8 in Plate 22.

To form these depressions, cut and shape a hardwood block as shown at 7 and use that as a die. The depressions should be about 3/8 in. in diameter and they need not be too deep. Punch a 1/16-in. hole in the center of each depression to take the protrusion of the hole in the bead.

Place the half beads in the depressions and flux the edges. Then lay a piece of solder across one edge, put flux on the top half and set it in place over the bottom half. Even up the edges. When they are all set, apply the heat slowly. It is well to have all of the solder snippets on the left side of the beads; then apply most of the heat to the right. The solder will follow the heat, and after the first bead is soldered, the next one is just about hot enough so that one can follow right along the circle. This all sounds easy, and it is if the metal is clean and properly fluxed. Then drop all of the pickled beads in the pickle after which they must be rinsed thoroughly in clean water to which some ammonia has been added to neutralize any sulphuric acid that might be inside the beads. When the hot beads are thrown into the pickle, they fill up with the acid, and if any of it is left inside, it will later on make the bead look as though it had a green eye. So rinse them carefully and thoroughly, and dry them well. The edges are then filed, as shown at 10, Plate 22, and then the beads are buffed as shown at 11. Buff each bead separately; a tip of a finger or thumb pressed against the bead prevents it from spinning on the wire.



A and B. Navaho necklaces. C. Zuni necklace
— The Taylor Museum, Colorado Springs, Col.

Squash Blossoms

The regular and most common squash blossom is composed of three parts — the bead, the trumpet, and the eye. See Plate 23. The Zuni type of blossom is also shown on that plate. The beads as a rule are the same size as the necklace beads except that a hole is punched through only one of the halves. The blossoms shown at 1, 2, and 3, Plate 23, are made with a tapered trumpet. A template is cut out of cardboard or tin for cutting out the blanks. The trumpets 4 to 8 are made of tubing which is hammered around a piece of metal, and then soldered along the seam. The petals are made by sawing as shown at 14, Plate 23. The blossoms at 1, 2, and 3 are formed with the aid of a suitable nail set and a groove cut into the end of a block of hardwood, as illustrated at 9, Plate 23. After the ends are evenly butted each trumpet is soldered, as shown at 10, Plate 23. The small end is then filed even and the hole is reamed with a small twist drill, as shown at 11. The petals are filed to shape after having been bent outward. The eyes are merely small square or oblong pieces of heavier silver with a hole drilled for the cord.

All of these parts must fit perfectly, of course, whether they are to be wired together or not, for soldering. The parts of the squash blossoms of the first necklace made by the author were soldered without wiring, by setting the trumpet part on a charcoal or asbestos block and setting in the bead, as shown at 12, Plate 23. The small protruding ends caused by punching the hole tend to seat the bead rather firmly. A slight twisting action with a little pressure usually causes the bead to set *tightly* in the trumpet. A small snippet of solder is set between the two parts, and the flux when dry helps to hold the parts in place.

The loops or eyes must also be fluxed and then set in place for soldering.

If the same solder is used for soldering the

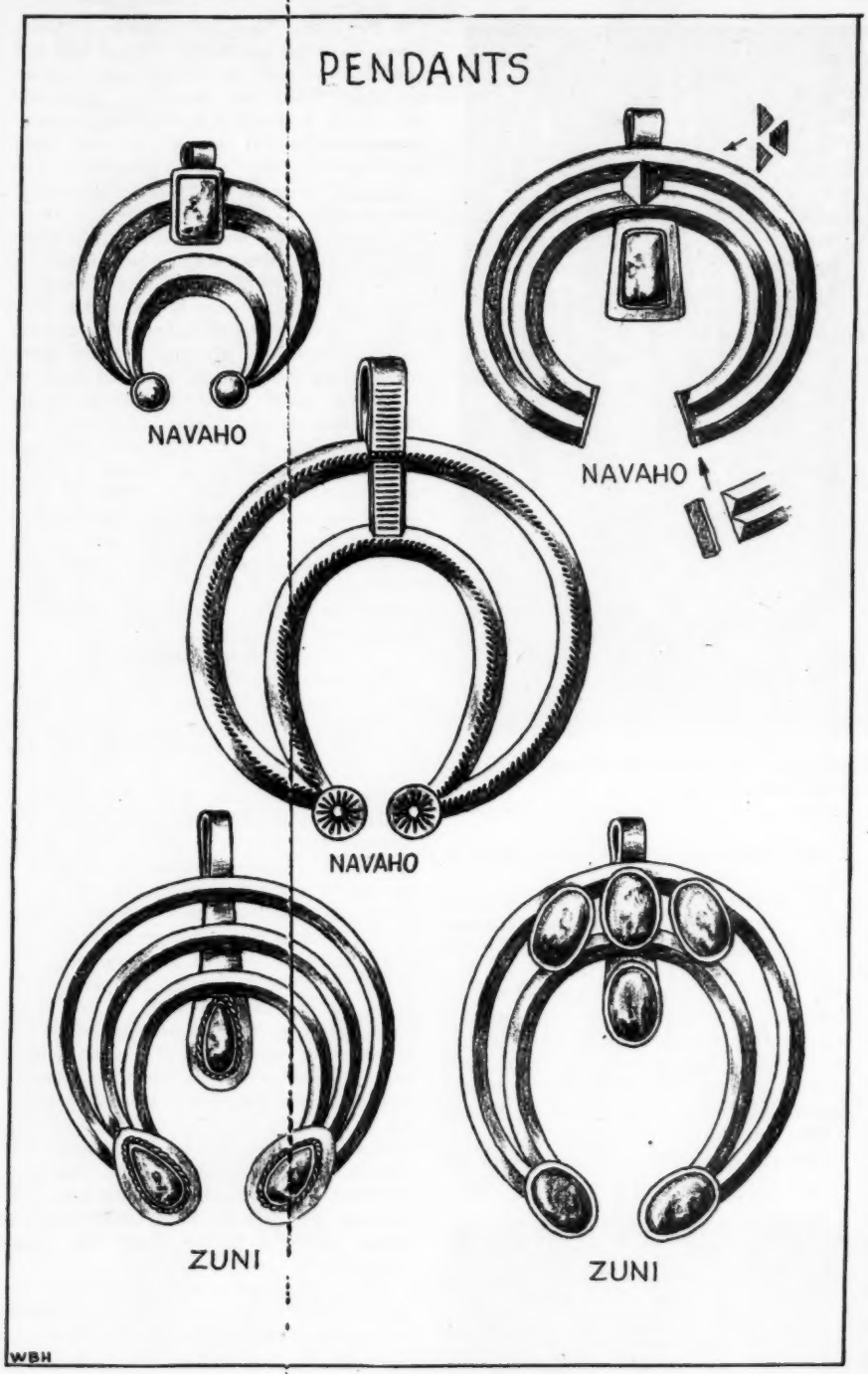


Plate 24

beads and the assembly of the parts, the soldered joints on the beads should be protected against the heat by painting them with rouge.

At 13, Plate 23, a wired assembly is shown. Some prefer this method of holding the parts for soldering, but wiring requires great patience. When wiring, be careful not to twist the iron wire too tight. Have it just tight enough to hold all three pieces together. A slight kink in the wire on one or both sides will tighten it still more. The Zuni squash blossom, shown at 8 in Plate 23, is quite frequently used and is simple to make. The trumpet is of the tubular type, slightly flattened at the top to fit the upper part. Any shape of turquoise may be used. At 7, Plate 23, is shown a tubular trumpet flattened at the upper end through which holes are drilled for the cord. This squash blossom is really only the trumpet part but tends to make an interesting necklace as shown at *A* in the illustration showing the two Navaho, and the one Zuni necklace.

The Pendant

Of the five pendants shown in Plate 24, the first one was cast in dentist's gray investment. The other five are made of triangular wire which is an easier and quicker way of making them. A pendant similar to the cast one can be made by filing triangular wire. About the only thing that might be added in the way of explanation is that when mounting stones over the wire, file down where the mount rests on the wire, or hammer down the seat of the mount with a flat-nosed punch.

Stringing

These necklaces are best strung on foxtail chain which can be bought at jewelers' supply houses. Good linen thread such as a six-strand Barbours linen sinew can be used, but be sure there are no sharp edges in the holes to fray the thread. The Indians frequently place a knot in the string between each of the beads, so that if the thread or cord breaks, only one bead can be lost.

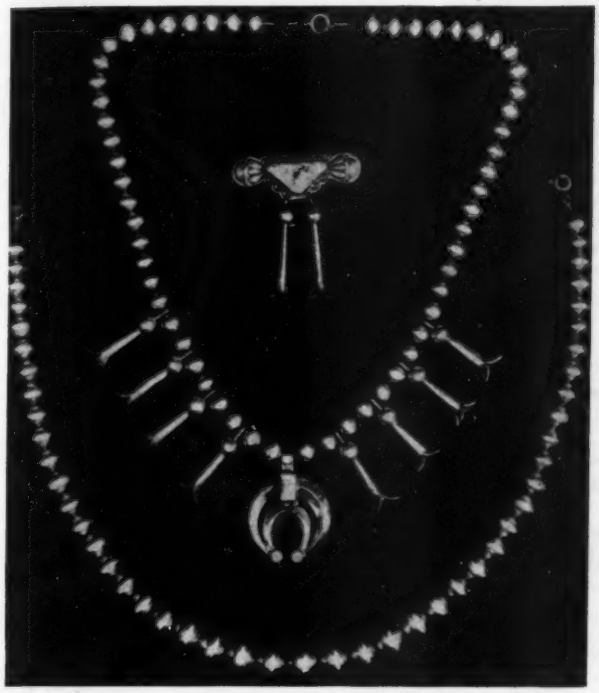
BOYPROOF LATHE CENTERS FROM SCRAP

HARTINGH W. BABCOCK
Detroit, Mich.

The only lathe tailstock centers that will survive the destructive use that a schoolboy can subject them to are those with tough, high-speed steel points. It is entirely within the ability of a high school machine-shop student of one year's experience to make this practical project. The materials are at hand in any machine shop. It is not necessary to buy high-speed steel or to put it through the difficult steps in the elaborate hardening process required.

The old saw about "an ill wind, etc," could be no more true than in this case. The well-known and universally used center drills (official name: combination drill and countersink) are being constantly broken in school machine shops. This is often painful to the school systems working with limited supplies. But there is a simple way to turn the loss into a profit. The broken center drills make perfect inserts for lathe centers. Most of them are high-speed steel, but even the carbon steel types wear well because they are extremely hard. The size used is ideal for the center holes drilled are always smaller than the large diameter of the drill.

The centers described in the following will stand the hardest kind of treatment. They won't burn off or wear away even when the green lathe operator runs the job so hot that friction turns it blue as much as an inch away from the center. For an experienced mechanic the old type of center is satisfactory because he knows the sort of care that it requires, but to expect a boy to get anywhere with them is bad judgment when the best may be had at practically no



Necklace and brooch made by the author

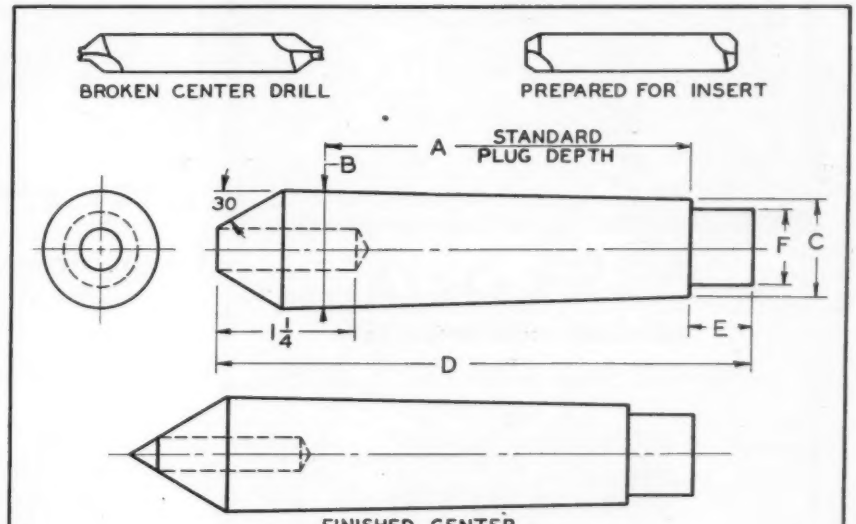
cost and are fine learning projects for the lathe student besides.

The sketches shown are for the most usual tapers found on the average lathe. If the lathe has an odd taper the necessary changes can be made in the shank, but all of the other steps are the same. The center drill used is No. 2 which is the size most commonly used. The first step is to obtain the stock for the shank or body. This may be any sort of material found in the steel supplies of the school shop. It is cut to 1/16 in. over the finish size, faced and center drilled on each end. The job is straight turned between centers to the large diameter. The taper may be cut with a taper attachment or the tailstock setover method. Generally the setup is made and the cutting started and continued until the small diameter is about .030 in. over the finish size. Check the shank in a gauge and finish turn. Adjustment of the taper set up is often necessary before the final cut may be taken. A fine finish is expected, but grinding is seldom necessary.

To finish the job the center is now mounted directly in the lathe headstock spindle. The lathe usually will have a taper in the headstock that is one size larger than the tailstock. Practically all lathes are equipped with a sleeve that will adapt the tailstock center to the headstock spindle.

There are three methods of making the hole for the press fit to the insert. The quickest is to use a carefully ground letter M drill. That is, the two lips must be exactly the same length and even then it will drill a hole as much as .003 in. oversize. This amount, however, would leave a perfect press fit for the No. 2 center drill body which is .300 to .301 in. in diameter. The second method is to drill a hole 1/32-in. smaller than the insert and then use a boring tool to enlarge the hole to size. This method is slow, but is the most accurate. If the letter M drill is not available and boring is too slow it is possible to make a special drill. This is done by taking a 5/16-in. standard drill and grinding the diameter down by hand at the bench or floor tool grinder. This isn't as difficult as it may sound. The drill is held against the wheel with two fingers in the flutes and drawn across the face of the wheel with the other hand. It rotates by its own spiral. Check it carefully with the micrometer until its diameter is about .005 in. under the center drill body diameter.

The insert is driven in with a hammer. Its ends should be ground flat as shown in the sketch. It is wise to wear goggles while putting it in because the shock of the hardened metal (the center drill) often results in chipping. The center is then ready for grinding. It is rough ground by hand on a tool grinder and then accurately finish ground on a universal grinder or at the lathe with a tool post grinder. When accurately ground to 60 deg. it is good policy to polish the point with fine emery cloth. This results in a *superfinish* job that always wears a lot longer.



MORSE TAPER NUMBER				
	1	2	3	4
A	2 1/8	2 9/16	3 3/16	4 1/16
B	.475	.700	.938	1.231
C	.369	.572	.778	1.020
D	3 7/8	4 1/16	4 11/16	5 9/16
E	3/8	7/16	9/16	5/8
F	5/16	1/2	11/16	7/8

Tailstock center

The center is then done. No hardening, annealing, or other steps are required. A dead center as good as this one is listed in the tool catalogs at $4. The one just finished will wear a long time. It can be reground in a few minutes. It is *boyproof* and will take no end of hard use. It costs about 4 cents for the steel of the body and nothing at all for the most important part — the point. It is a good teaching device and instills respect in the student for the value of salvaged materials.

ADJUSTABLE JIG FOR BENDING PLASTICS

H. A. BAILEY

Samuel P. Langley High School

Pittsburgh, Pa.

It takes only a little experience with bending the thermoplastic plastics such as Plexiglas or Lucite to show the need of bending forms or jigs. This becomes particularly necessary when parts must be made in pairs or sometimes in larger numbers and especially when accurate symmetrical curves are to be made.

The adjustable bending jig shown in Figure 1 removes much of the temptation from the beginner, who is likely to continue to bend plastic which has already cooled too much, and thus break it. Of course plastic which is over ¼ in. thick retains the heat longer than the more commonly used 3/16- or ⅛-in. thickness. This latter cools rapidly and must be shaped quickly or it must be reheated if it is not correctly formed to the desired shape. The jig is made entirely of wood and will present little difficulty to the average woodshop pupil or home craftsman who has access to a small wood-turning lathe.

Absolute rigidity of the fixed parts of the jig is secured by fastening these with glue and dowels. Note that the center of the ⅜-in diameter hole in the fixed part is exactly 1 in. from the 1-in. mark on this part.

In use, a cylinder of the desired size is placed in this hole and another cylinder in the movable part which is then moved along the scale to the correct distance. Figure 1 shows the jig set with centers 1½ in. apart. It will be seen that reversing the movable piece *B* will enable the user to get a total distance of 11 in. from center to center. A full set of forming cylinders may consist of two each ½-in., ¾-in., 1-in., and 1¼-in. diameters, with one each of ⅜-in., ⅝-in., ⅞-in., 1 1/16-in., 1⅛-in., 1⅜-in., and 1½-in. Figure 2 shows an orderly method of holding these cylinders on a block base with holes bored at convenient points.

An example of the use of this jig is shown in Figure 3, where a curtain holdback made of 3/16-in. thermoplastic material is pictured. It will be noted that a cross section of the interior window frame has been shown in outline. The 3/16-in. holes in the one end are for use in fastening the plastic to the window frame with ¾-in. long r.h. screws.

Designs numbered 1, 2, and 3, Figure 3, may be made with beveled edges, or the lines shown may be cut into the surface either with a hand tool such as a riffle file, an auger bit file, or with a high-speed rotary

(Continued on page 20A)

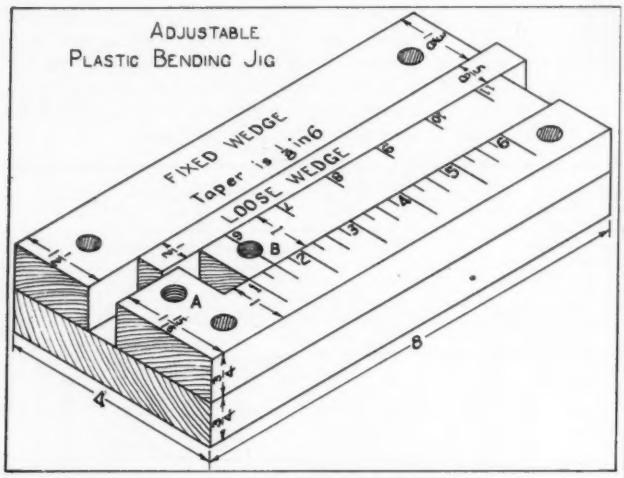


Fig. 1. Adjustable bending jig

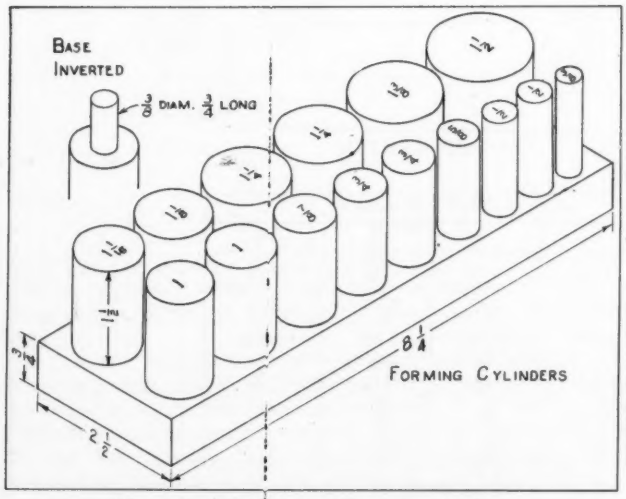


Fig. 2. Holder for forming cylinders

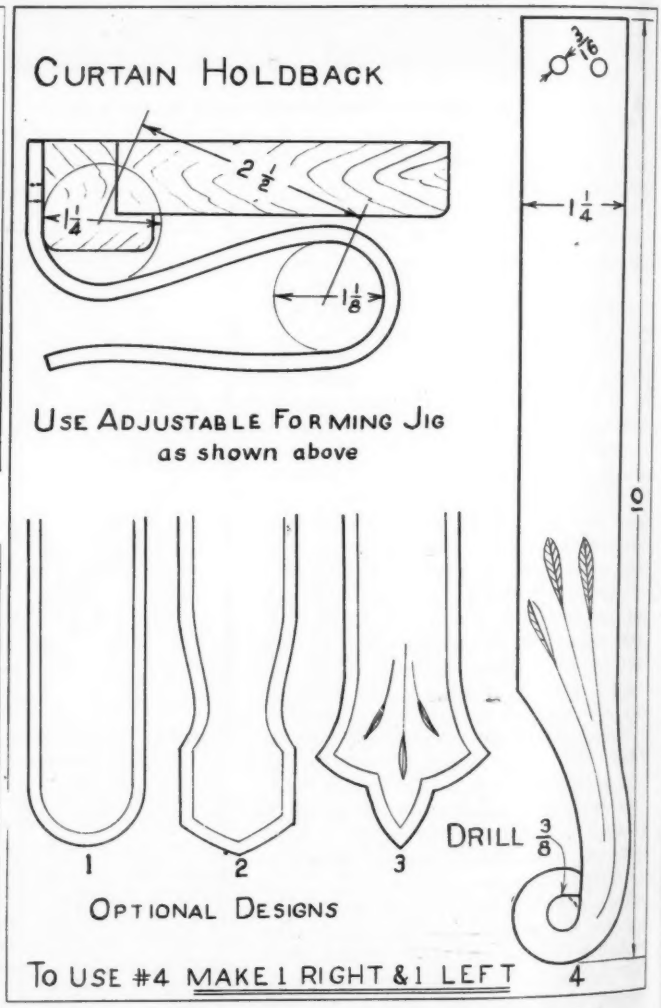


Fig. 3. Various designs for holdbacks; also method of fastening them to the window frame

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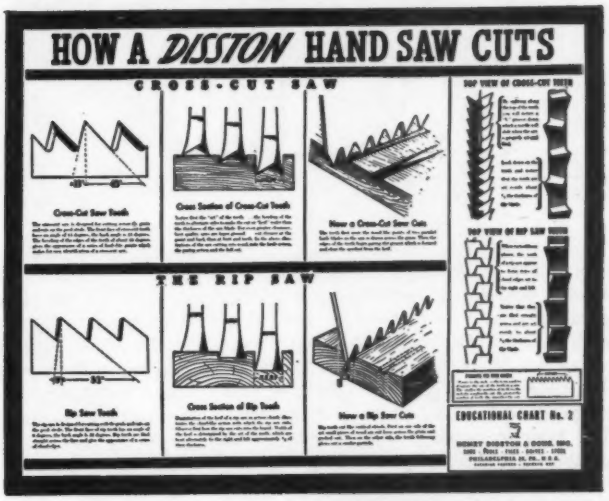

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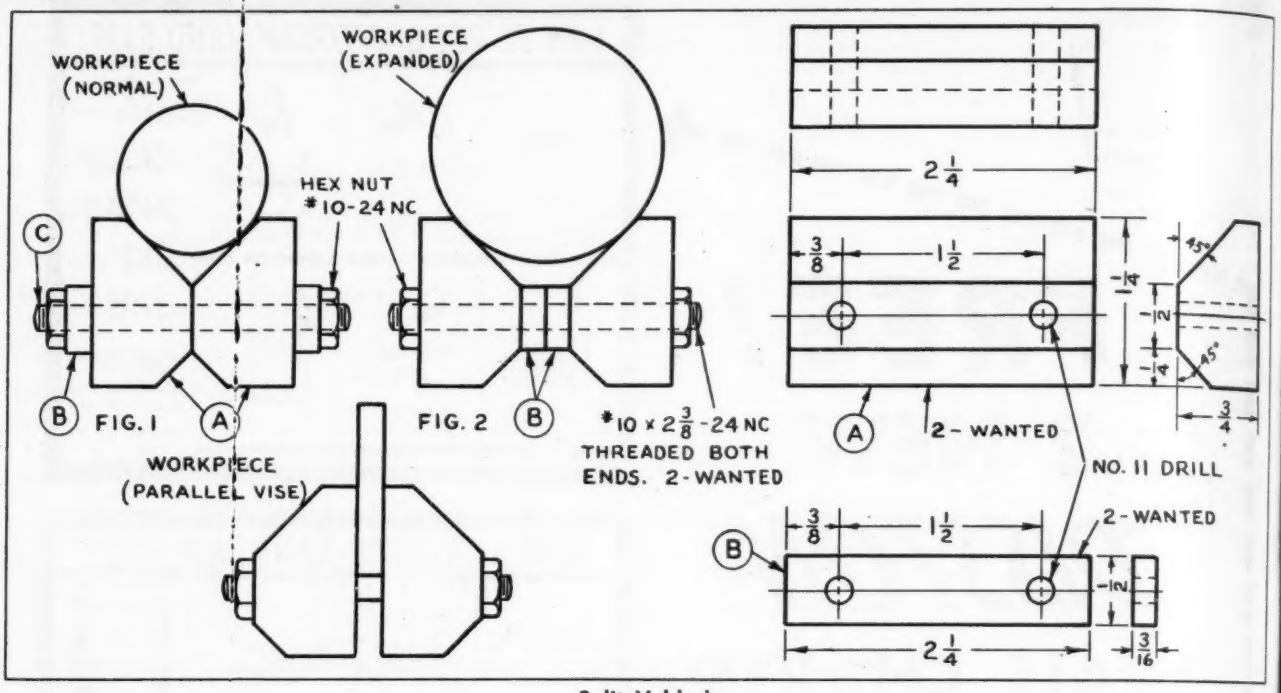


Split V blocks

(Continued from page 214)

tool or a flexible shaft with small drill chuck and some dentist-type tools of carborundum. Regardless of which method is used it is desirable to use templates or irregular curves, etc., as guides. The degree of surface hardness is less than that of glass but does not lend itself easily to freehand work in decorating.

The beginner working with plastic should remember that drilling, perforating, edge and surface decorating and polishing is easier to do while *in the flat*, and that the final beauty of the object depends more on these factors than on the bending although this last item makes possible over three fourths of the useful and beautiful objects.

Bending plastic can be done freehand but planned curves are always more attractive and forms and jigs are indeed indispensable where accuracy in fitting to other parts is necessary. Time spent in making the adjustable bending jig described in this article will be repaid many times, for it lends itself very well to the designing of new plastic projects with all sorts of curves.

SPLIT V BLOCKS

H. MOORE
Kirkstall, Leeds, England

Some interesting and useful machining is provided by the making of a pair of split V blocks similar to the one shown in the illustration. These blocks are light in weight and yet strong enough to hold work which would normally require heavier blocks. Further, the split feature enables them to be used as handy parallel vises.

The V's *A* are machined in one piece and sawed off to length. Parallel bars *B* are cut off the same length, after which two V's and two parallels are clamped together and drilled through for the studs *C*.

Ordinarily, the V blocks appear as shown at Figure 1, with the parallels one at each side. For work that is too large for this V, the parallel bars are placed between the V's, as shown in Figure 2.

To use the blocks as parallel vises simply turn them around to bring the flat sides opposite each other. They can then be used for any kind of flat bars of reasonable size for holding them parallel and at right angles to the table.

For laying out work, or for light drilling, these blocks, either as V blocks or parallel vises, are genuinely useful. They are not intended for any other kind of work.

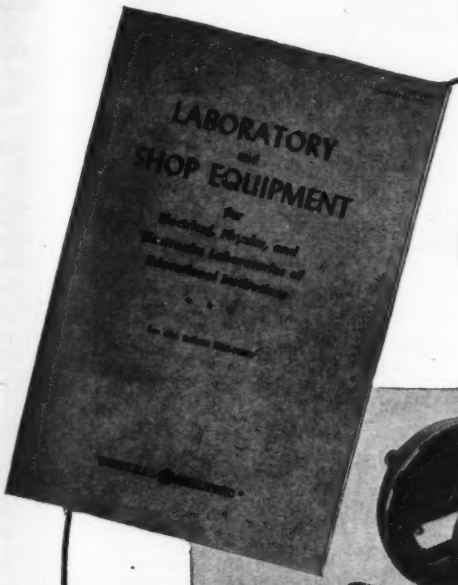
A.V.A. DELEGATES VISIT SANTA BARBARA

One of the attractions as a culmination of the A.V.A. convention in Los Angeles was "Open House at Santa Barbara" on Friday, December 19, the day following the convention. Invitations to those attending the convention had been issued by Dr. J. Harold Williams, acting provost, University of California, Santa Barbara College, to spend a day in Santa Barbara visiting the modern industrial-arts plant and participating in a planned program throughout the day. These invitations were issued in several journals of national circulation and through a special folder produced in the print shop at Santa Barbara and distributed widely at the convention.

The program for the day which was planned by Professor Emanual E. Ericson, chairman of the department of industrial arts, and the teaching staff of twenty members included a visit of the main industrial-education building and the buildings used for the teaching of applied horticulture from 10:00 to 12:30. This visit was made under actual operative conditions since the college had not yet recessed for the Christmas vacation. The visitors had the opportunity first of taking a complete tour through the main building with its 62,000 sq. ft. of floor space including three drafting rooms providing for 30 students each, two woodworking shops, a

(Continued on page 22A)

Head table at banquet on "Santa Barbara Day." Left to right: Emanuel E. Ericson, Dr. Baldwin M. Woods, William E. Warner, Frank C. Moore, Warren Newby, and Rev. Kells Swenerton



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As an indication of the number who accepted the Santa Barbara invitation, there were 260 persons attending the evening banquet at the El Paso restaurant after some had to be turned away for lack of space. During that program, partial roll call of individuals representing various different areas was taken. Introductions were made of guests from New York, Pennsylvania, Ohio, North Carolina, Texas, Missouri, Oklahoma, Oregon, Arizona.

The main address of the evening was delivered by Dr. Baldwin M. Woods, professor of engineering, University of California, Berkeley, and director of University Extension for the University of California. The topic of the presentation was "Technology and Education," and the speaker clearly presented the opportunities on the part of those engaged in various phases of technical education to make a contribution to the educational program in modern society. The feeling of everyone appeared to be that the day was an enjoyable and educational one, and that the Santa Barbara program of industrial education was well worth the visit.

Personal News

♦ ROLAND M. TORGERSON has been elected associate professor and chairman of the department of industrial arts at the Bowling Green State University, Bowling Green, Ohio.

♦ GERALD BAYSINGER has been transferred from Mackenzie High School, Detroit, Mich., to the department of industrial education, Wayne University. In this capacity he supervises student teaching, counsels undergraduates, and teaches a few of the professional courses.

♦ On leave of absence from Louisiana State University, NELSON A. HAUER is enrolled at Cornell University in preparation for a Ph.D. with a major in industrial education and minors in human relations and personnel management.

Mr. Hauer, at present head of the department of industrial education and associate professor at Louisiana State University, served through the war years in industrial education with the navy, retiring in 1946 with the rank of lieutenant commander as educational supervisor to the organized naval reserves. Mr. Hauer received his B.S. degree in industrial education from the Louisiana State University and has also studied, for limited periods, at State Teachers College, Oswego, N. Y., and Pennsylvania State College. Mr. Hauer entered the teaching profession from the sheet-metal working trade.

♦ Appointments of seven new teachers at the Milwaukee School of Engineering was announced recently by Oscar Werwath, president. They are: ALFRED NEWLANDER, physics instructor; CLEMENT PURTELL, drafting; REX D. MERRIMAN, drafting and mechanical blueprint reading; MRS. MARGARET FOX ROSEN, English; JOHN BEAMISH and CONRAD FARNER, mathematics; CHARLES BERTHET, heating design.

♦ WOODROW JACKSON, Milwaukee Vocational School teacher, was recently named principal of Sevastopol High School by the board of education of that community. He succeeds E. A. Moede, who resigned to become superintendent of schools at Oconto Falls.

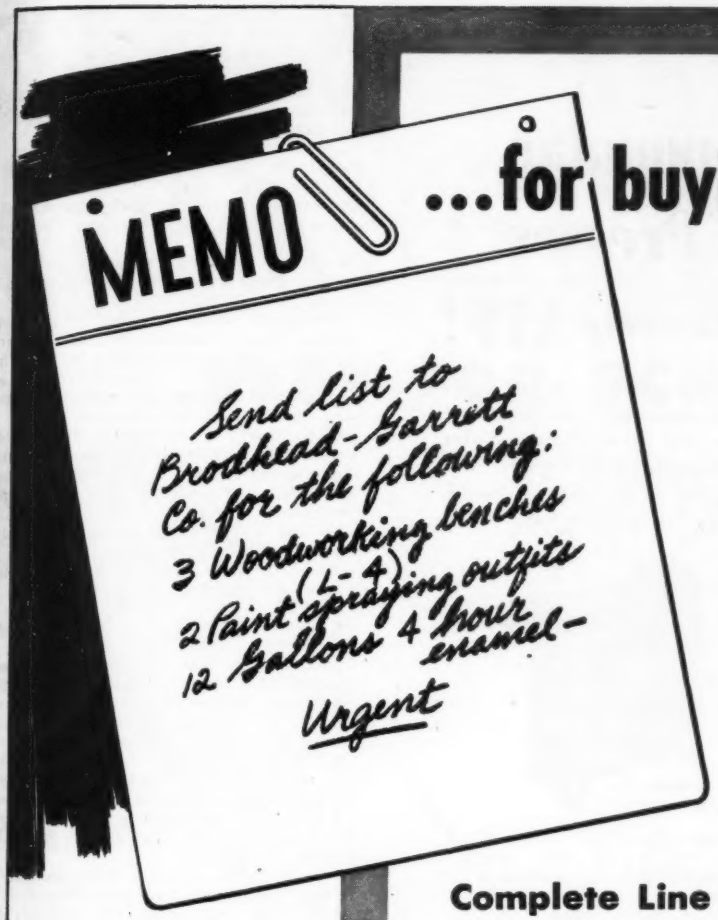
♦ ROBERT H. DOUGLAS is instructor of industrial arts in Algoma, Wis.

♦ EDWARD CHARLES ROEBER, formerly associate professor of education, and director of guidance and counseling, was appointed assistant professor of education at the University of Missouri, Columbia, Mo.

♦ FLOYD HAROLD PERCY was appointed instructor of auto mechanics at Kansas State Teachers College, Pittsburg, Kans.

♦ HERBERT A. MCCONNELL received his master's degree in industrial education at the University of Missouri at the close of the 1947 summer session and returned to his position as instructor of

(Continued on page 24A)



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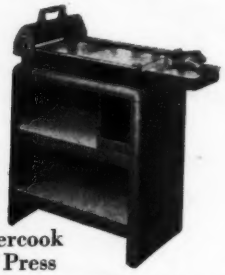

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(Continued from page 22A)

industrial arts at the Wyandotte High School in that city.

♦ The following four graduate students received the master of science degree at the end of the first semester from The Stout Institute, Menomonie, Wis.: WALTER LATODRESSE, Austin, Minn.; WILLIAM WATSON, Tocamcari, N. Mex.; HAYDEN CARMICHAEL, Morehead, Ky., and ROBERT INNIS, Alden, Mich.

♦ HAYDEN M. CARMICHAEL was appointed instructor in metal trades at Fairmont State College, Fairmont, W. Va.

♦ MAURICE J. NELSON, professor of industrial education at the Mankato State Teachers College, Mankato, Minn., will celebrate his thirtieth anniversary as instructor at that institution.

♦ JOHN STONE, a graduate of Ball State Teachers College, has returned to Marion, Ind., this year, to teach general shop in the McCullough Junior High School.

♦ CLARENCE FAUBER, JR., received his master of science degree in Trade and Industrial Education from Purdue University in February, 1948. He has accepted the position as head of vocational drafting in the Kokomo, Ind., schools.

♦ JOHN CARBONE is teaching general shop at Hartford City, Ind.

♦ LAWRENCE MEYERS, who has been teaching in the general shop at Hartford City, Ind., along with diversified occupations, is now handling the high school guidance program in addition to his diversified program.

♦ D. B. DOTY, on leave from the Eastern Kentucky State Teachers College, Richmond, Ky., is now a part-time instructor and graduate student in industrial education at the University of Missouri, Columbia, Mo.

♦ CHARLES WHITTIER, formerly teacher of printing at the Alexander Hamilton School, Cleveland, Ohio, has been transferred to Wilbur Wright at Cleveland, as teacher of printing.

♦ BILL HOFFMAN has been transferred from the Wilbur Wright School, Cleveland, Ohio, to West Tech of that city to teach drawing and electricity.

♦ JAMES DANIERO has been appointed to teach drawing in the Bainbridge Junior High School, Richmond, Va.

♦ WESLEY BAGAN is teaching the general metal shop in the John Marshall Senior High School, Richmond, Va.

♦ JAMES JENKINS is teaching industrial arts and mathematics in the Ferguson Twp. Schools, State College, Pa.

♦ DICKEY BROESEKER is teaching industrial arts in the high school at Meyersdale, Somerset County, Pa.

♦ ATHOL R. BAILY, principal of Portland Apprentice School, Portland, Ore., has been granted a leave of absence to complete the work for his doctor's degree. He is currently enrolled at the University of Missouri where he is also teaching part time in industrial education.

♦ TED HARTMAN, mechanical drawing teacher at West Tech, Cleveland, Ohio, was appointed this semester to assist Gerald Irons, housing and bounderies commissioner for the board of education.

♦ EDGAR J. SPADY, director of vocational and industrial education of the public schools, Oklahoma City, Okla., will teach at the summer session at Oklahoma A. & M. College, Stillwater, Okla.

♦ FRANK VUKOVICH, who formerly taught at the Terrace School for Craftsmen at New Castle, Pa., is now teaching industrial arts in the high school at Johnsonburg, Elk County, Pa.

♦ ANDREW J. ONDREI (1947) is teaching woodworking and drafting in the East Brady High School, East Brady, Clarion County, Pa.

♦ VINCENT C. PUGLISI is installing equipment and reorganizing the industrial-arts program in the high school at Hastings, Cambria County, Pa.

♦ WILLIAM J. SULLIVAN is teaching in the West Pottsgrove Township High School, Stowe, Montgomery County, Pa.

♦ THEODORE J. ZAJAC is doing graduate work at the University of Pittsburgh, Pittsburgh, Pa.

♦ WILLIAM SANDMEYER, who formerly taught in the high school at Munhall, Pa., is now teaching industrial arts at Picture Rocks, Lycoming County, Pa.

♦ LAWRENCE S. WRIGHT, of Menomonie, Wis., has completed the work for the master's degree at The Stout Institute and is now employed part time in the Engineering College at the University of Missouri where he is doing graduate work toward the doctor's degree in industrial education.

Association News

♦ The 23rd Annual Conference on Printing Education is scheduled for June 21, 22, and 23, 1948. It will be held at Hotel Pennsylvania, New York City.

The general arrangements for the program and other details are in the hands of Past President Ferdy J. Tagle of The New York School of Printing. The special feature will be the annual conference dinner to be held on the evening of June 22. For this meeting Harry L. Gage, consultant, Mergenthaler Linotype Company, and chairman of the Advisory Council on Graphic Arts Education; and John A. Wilkens, vice-president of Sweeney Lithographic Company, Belleville, N. J., and member of the Advisory Committee of The New York School of Printing, are co-operating with President Tagle.

♦ The thirtieth annual convention of the New Jersey Vocational and Arts Association was held at Asbury Park, March 18 to 20. The theme of the convention, "Education for Living," was

(Continued on page 27A)

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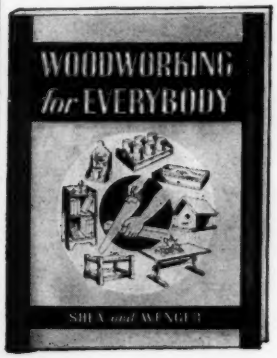

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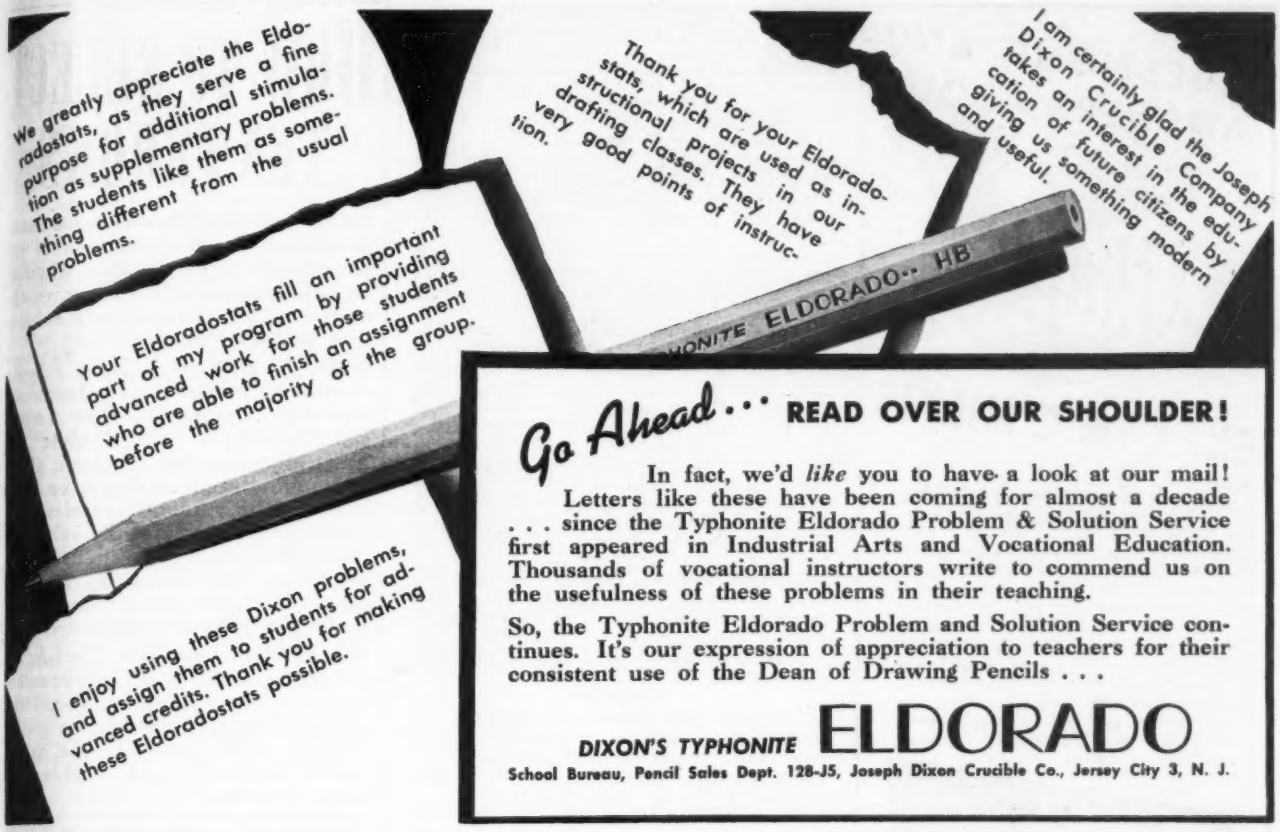
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(Continued from page 24A)

introduced at the first general session by Dr. Dora S. Lewis, dean of Hunter College, and Dr. H. H. Giles, executive director, Bureau of Intercultural Education, New York City. Holmes Cliver, vice-president of the association, acted as chairman of the meeting.

Dr. Lewis, speaking on the subject, "General and Vocational Education for Family Living," emphasized that while preparation for work to bring economic security was essential, preparation for family life was also an extremely important part of education, regardless of the subject taught, whether in a classroom or a school shop. She indicated the responsibility for the preparation for family life is that of all concerned with education and the solution is the co-operation of all parents, teachers, and administrators — not in additional courses.

Dr. Giles, speaking on "Education for Democratic Human Relations," expressed the idea that all human beings should get a fair and equal opportunity to develop his desirable talents and that the difference between our principles and practices is the cause of trouble between individuals or nations. He believes the basis of living in a democratic society involves the realization of the inherent rights of human beings, and that we must depend upon and work with each other, building human relations from what we have locally and not by international agreements or federal enactments. In the final analysis it is a personal problem to deal with human feelings intelligently and until all teachers realize this and educate themselves so as to enlighten parents through their children, progress will be slow.

Veterans' Education

Preceding the first general meeting the supervisors and administrators met to discuss problems involved in the education and training of veterans with John A. McCarthy, assistant commissioner for vocational education, New Jersey State Department of Education, acting as chairman.

P. M. Daab, chief of vocational rehabilitation and education division, Veterans Administraton, Newark, outlined the complete job which has been and is being done for veterans' education in New Jersey. The revolving fund of $750,000 appropriated by the state to be borrowed upon by local school districts to get approved programs under way before the federal money becomes available, was only one of the special services stressed.

Arthur B. Wrigley, state supervisor of trade and industrial education, reported on a study to determine the extent to which apprentices currently employed in New Jersey are enrolled in organized related instruction programs. This study showed only 14 per cent of apprentices in training were not enrolled in schools for related work. The present practice leaves the job processes to industry with schools shouldering the responsibility for the related work. At present the apprenticeship programs in New Jersey cover 150 different trades or avenues of employment with 7500 establishments approved. Eight thousand two hundred fifty-seven apprentices are employed out of approximately 14,000 approved possibilities.

H. O. Sampson, state supervisor of agricultural education in New Jersey, outlined clearly the difficult problem of on-the-job training on the farms, which so radically differs from the apprenticeship programs in urban centers. At present there are 629 trainees on farms, instructed in related work by traveling instructors, with limited enrollments in some centers from five to one hundred. The qualified teacher shortage is hampering the best results of the program.

Guidance and Placement

The theme of the guidance and placement sectional meeting was "Guidance for Living," and was conducted under Sallie H. Richardson as chairman and Mrs. Alice Rustolo as moderator.

Joseph Kriesell, guidance counselor of Middlesex County Vocational schools, covered the theme of the meeting from the standpoint of the health program. He insisted that the key person in reporting physical defects is the classroom teacher.

George Field, director of veteran and adult education, Bridgeton, N. J., discussed the theme through social and communities activities. The Bridgeton program, consisting of committees of educators, social agencies, police department, and parents, studied the community needs of youth and set up their successful program.

Mrs. R. Neal Owens, of Essex County Vocational and Technical High School of Newark, discussed student participation in school. A program of students' clubs to develop proper citizenship in a democracy was outlined, including a student council, school paper with all activities springing from the needs of the students. The program is aimed to develop respect for human and civil rights, encouraging participation in community work.

Ephriam Yohannan, guidance counselor, Thomas A. Edison Vocational and Technical High School of Elizabeth, covered guidance in selecting a vocation, by outlining the program in his school covering personality adjustment to others and the job, their system of records, tests, and interviews.

Edward J. Coughlin, placement adviser of Essex County Department of Guidance and Placement, discussed guidance through placement and follow-up. He outlined the necessity for a placement bureau, co-operation with industry, adequate records and thorough understanding of job requirements. The periodic follow-up on the success of students placed in work was emphasized.

(Continued on next page)

QUESTIONS AND ANSWERS ABOUT

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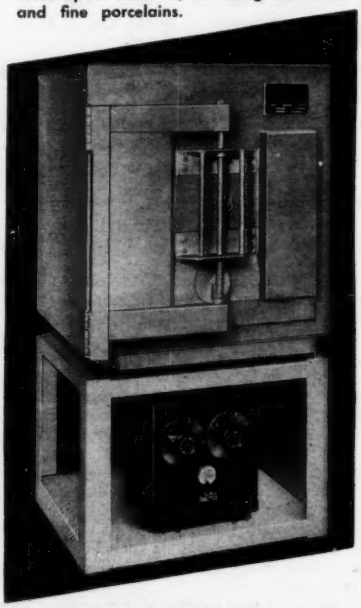

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(Continued from previous page)

Frank Connolly, state supervisor of occupational information and guidance, gave a brief summary of the guidance sectional meeting.

Industrial Arts

The first sectional meeting of the industrial-arts group brought out the necessity for the formation of an Industrial Arts Association for New Jersey to be affiliated with the New Jersey Vocational and Arts Association, and with the New Jersey State Educational Association, holding meetings at the annual conventions of both associations. A constitution was presented and passed. The officers of the New Industrial Arts Association of New Jersey will be elected prior to January 30.

The second and final meeting of the industrial-arts instructors presented the theme. "Education for Living in Our Present Industrial Arts Era." Constantine J. Harper acted as chairman and Thomas F. Kinney, director of home, fine, and industrial arts, Trenton, made an impressive plea for the complete membership of all New Jersey industrial-arts teachers in the New Industrial Arts Association.

Vincent W. Dresser, instructor of art metal, Red Bank, demonstrated how projects made from aluminum, played their part in education for living.

George S. McGinnley, field engineer for Alloys Corp., New York, demonstrated eutectic low temperature welding rods before an enthusiastic audience. Welds were made and tested for strength in a practical, interesting, and profitable demonstration.

Graphic Arts

The graphic arts section was addressed by S. Preston Hipsley, director of personnel, of the government printing office, Washington, D. C., and he was introduced by Chairman W. Theodore Hearn.

Mr. Hipsley, speaking on the convention theme, "Education for Living," emphasized the importance of the development of acceptable work relationships in industry. He stated that the most important function of the vocational instructor is to prepare young men and women to "get along with people." Mr. Hipsley cited several examples to support his point of view.

Other Sectional Meetings

Sectional meetings were held on building trades with Arthur D. Roberts as chairman; metal trades with John Bambara as chairman; women's trades with Mrs. Myrtle Green as chairman; science and technical with Benjamin I. Corson as chairman; home economics with Mary E. Mahoney as chairman; fine arts with Joseph Domareki as chairman; academic subjects with Arthur B. Wrigley as chairman; and vocational agriculture with H. O. Sampson as chairman.

♦ The tenth annual Industrial Arts Spring Conference will be held at the Oswego State Teachers College, Oswego, N. Y., on Thursday and Friday, April 29 and 30. Since its inception, this conference has attracted an ever increasing group of teachers, principals, and superintendents. This year, between three and four hundred are expected to attend, and its program promises to be of the finest caliber. Dr. Gordon O. Wilber, director of the industrial-arts department, and Arthur Hauler, supervisor, are in charge of program details.

The main speaker of the conference will be Dr. Lee Hornbake, professor of industrial-arts education at the University of Maryland. Dr. Hornbake will speak at the opening session at 10:00 a.m., Thursday morning, and also at the banquet sponsored by Epsilon Pi Tau at the Hotel Pontiac on Thursday evening. He was a teacher on the Oswego faculty for more than three years and received his bachelor's degree from California, and did his graduate work at the Ohio State University. Dr. Hornbake's program at the University of Maryland is rapidly

(Continued on next page)

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1. Fundamentals of Carpentry — Tools, Materials, Practice. Vol. I. $3.25
2. Fundamentals of Carpentry — Practical Construction. Vol. II. 4.25
3. Masonry Simplified — Tools, Materials, Practice. Vol. I. 4.50
4. Masonry Simplified — Practical Construction. Vol. II. 5.00
5. Building Trades Blueprint Reading Part I. 2.25; Part II. 2.25
6. Simplified Architectural Drawing. 5.00
7. Steel Square. 2.25
8. How to Design and Install Plumbing. 3.50

ELECTRICAL TRADES

9. Alternating-Current Motors. $3.00
10. Direct-Current Motors and Generators. 3.00
11. Electric Generators. 2.75
12. Transformers. 2.75
13. Interior Electric Wiring and Estimating. 2.75
14. How to Read Electrical Blueprints. 3.25

MACHINE AND ALLIED TRADES

15. Machine Shop Work. $3.75
16. Machine Trades Blueprint Reading. 2.25
17. Metallurgy. 5.00
18. Tool Making. 4.00
19. Sheet Metal Work. 3.00
20. Pattern Making. 2.25

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21. Practical Descriptive Geometry. $3.50
22. Plastics. 5.00
23. How to Read for Self-Improvement. 2.75
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becoming one of the outstanding industrial-arts programs of the nation.

Other presentations on Thursday morning will include a panel discussion on the subject "The Fifth Year and the Master's Degree at Oswego," and a pertinent summary of industrial arts in New York State by the state supervisor of industrial arts, Roy G. Fales.

Both Thursday and Friday afternoons will feature shop and laboratory demonstrations and exhibits. These demonstrations will be mainly executed by students at the college although some commercial demonstrations are anticipated. One such demonstration scheduled to date is on "low temperature welding," by Thomas Berry of the Allstate Welding Alloys Co.

Friday morning's program will consist of a presentation by John L. Miller, superintendent of schools at Great Neck, L. I. This will be followed by a discussion of driver education and training by Harold O. Carlton, the educational consultant for the American Automobile Association.

The noon luncheon on Friday will bring Fred Finsterbach from Buffalo State Teachers College to speak on the subject of "The Use of Color Dynamics in the School Shop." Mr. Finsterbach is the teacher of the general shop at Buffalo State and has made remarkable progress in the use of color in school shop programs. Music at the Thursday and Friday luncheon will be by college groups under the direction of Dr. Maurice Boyd, director of the Oswego State College music department.

♦ The Industrial Arts Teachers Professional Association of Allegheny County, met at the Brentwood Junior-Senior High School, Brentwood, Pa., recently. Earl Kuhn, the industrial-arts instructor at Brentwood High School, was host to the large group of teachers.

The next meeting at the Knoxville Junior High School, will be a joint meeting with the Trade and Industrial Education Association of Pittsburgh. Dr. Anthony Goldberger, of the vocational-education department of the University of Pittsburgh, will be the speaker.

A tour will be made of the wood, machine, print, and prevocational shops, where there will be demonstrations and exhibits. As usual there will be teaching aids and project patterns for distribution to the members.

An original design by John Barney of Har-Brack Junior High School was approved for the new membership cards.

♦ The California Industrial Education Association Annual convention will be held on April 23 and 24, 1948, in San Jose, Calif. There are approximately 3000 teachers and administrators of trade training and industrial education in the state of California, and a good representation of these people is expected. These delegates from the various school districts determine, to a large extent, shop and technical equipment purchases to be made in their respective districts; hence, they are an audience especially interested in such equipment and supplies. State and national leaders in the fields of industrial arts and vocational arts will be on the program.

The headquarters for the convention and all activities of the delegates will be centered around the Civic Auditorium of San Jose. Space is being made available for display of books, tools, equipment, and other merchandise which is of interest to trade and technical classes and schools. — *O. S. Walsh.*

♦ The Miami Valley Industrial Arts Association met at the Roosevelt Junior High School, Middletown, Ohio, on March 13, 1948.

The morning session was devoted to school shop inspection, the observance of the exhibits displayed by various instructors, and round-table discussion. The discussion was opened by President E. J. Robinson of Dayton and later taken over by Clyde Pierson, program chairman. Much interest was evidenced on many questions, of

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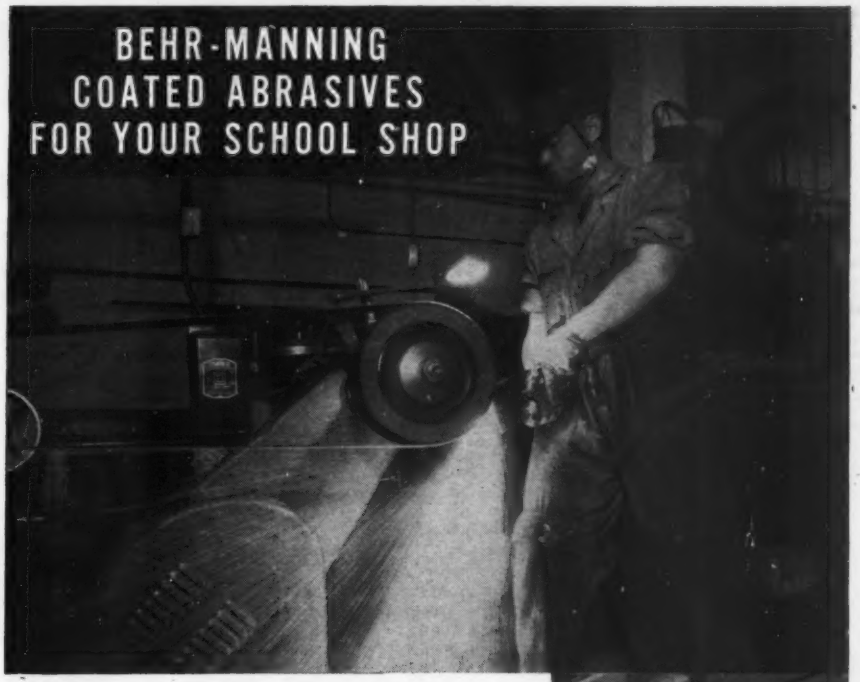

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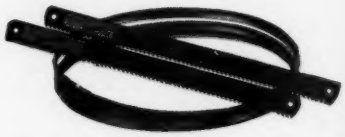

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which the following two were stressed, "Industrial Arts for the Slow Learner?" and "How Can State Supervision Be of Value to Us?"

The discussion was recessed at noon for a luncheon which was served in the school cafeteria.

At the close of the luncheon the nominating committee of M. D. McCall, Oxford; Paul Krebs, Middletown; and J. A. Frehse, Piqua, offered the names of Menzo Stark, Wilmington, for president; John Seaman, Glendale, for secretary-treasurer; and E. O. McArthur, New Miami, for program chairman. The association accepted the report and declared the nominees elected to office.

The next meeting, to be held at about the same time next year, will be at Oxford. The invitation to Miami was quickly accepted.

After Mr. Pierson gave instructions on how to reach the Armco where he had planned an inspection trip for the afternoon, President Robinson adjourned the group. — *John Pressler*, secretary-treasurer.

New Publications

Plastics Made Practical

By Chris H. Groneman. Cloth, 324 pp., 6¼ by 9½ in., illus., $4.50. The Bruce Publishing Co., 540 N. Milwaukee St., Milwaukee 1, Wis.

An excellent book on plastics which gives a brief history of the development of this very interesting material. The various types of plastics and their uses are explained in nontechnical language. Then follow over 100 well-designed projects of many kinds which can be used in the school as well as in the home shop.

The book is well illustrated, and each of the problems is accompanied by a bill of material and step-by-step directions.

Fundamentals of Carpentry, Volumes I and II

By Walter E. Durbahn. Volume I, cloth, 334 pp., 5¾ by 8½ in., illus, $3.25. Volume II, cloth, 444 pp., 5¾ by 8½ in., illus., $4.25. American Technical Society, Chicago, Ill.

These two volumes, written by a man who has had much experience both as a tradesman and as a teacher, form an encyclopedic text on carpentry.

The first volume describes carpentry as a trade, the history of carpentry tools, modern tools and how they are used, kinds of wood and their uses, insulation, wood fastenings, blueprint reading, and home planning.

The second volume is devoted to practical construction, and explains the carpenter's work, starting with the foundation, and takes the reader through wall and floor framing, and roof framing, onward until the exterior and interior finish has been applied.

There also is a chapter on farm buildings.

The appendix of these volumes contains tables and charts which will be found handy by the carpenter mechanic; also a glossary of trade terms. A number of blueprints also are included.

Tool Steel Simplified

By Frank R. Palmer and George V. Luerssen. Cloth, 564 pp., 6¼ by 9¼ in., illus., $2. The Carpenter Steel Co., Reading, Pa.

This is a revised edition of a book that has long been used as an authoritative guide on steels used for many purposes. It explains thoroughly the "Matched Set Method" which was devised by one of the authors working in conjunction with the research department of the firm in which both of the authors are executives.

This matched set method helps users of steels solve very many troublesome problems. The explanation of how to use this method in the selection of the right kind of tool steel, how to give it the proper heat-treatment, are all clearly explained in the book. The interesting "Tool Steel Selector" occupying over 60 pages of the book, in itself, is a very helpful aid to the man who has tool-steel problems to solve.

Apprenticeship Credit for Previous Experience

Paper, 28 pp., 5⅞ by 9⅛ in. Obtainable by writing to Apprentice-Training Service, United States Department of Labor, Washington 25, D. C.

This is a study made to ascertain what present practices are. A summary of these practices shows what was done in 39 programs.

Civilian Mission

By Donald Holbrook. Cloth, 58 pp., 5½ by 8 in., $1.50. Bruce Humphries, Inc., 30 Winchester St., Boston, Mass.

A very useful little book for those who are about to enter college and are pondering on the serious question of "What shall I do for a living?" It is a stimulating guide.

The Expanding Role of Education

Cloth, 484 pp., 6¼ by 9⅛ in., illus., $3. This is the Twenty-Sixth Yearbook of the American Association of School Administrators, 1201 Sixteenth St., N.W., Washington 6, D. C.

Besides discussing the extension and enrichment of education for young children, adolescents, and adults, the personnel required to present an adequate program, and the plant, equipment needed, and financial support for doing an acceptable job, are all presented.

Modern-School Geometry

By John R. Clark, Rolland R. Smith, and Raleigh Schorling. Cloth, 436 pp., 5⅝ by 8¼ in., illus., $1.88. World Book Co., Yonkers-on-Hudson, N. Y.

(Continued on page 32A)

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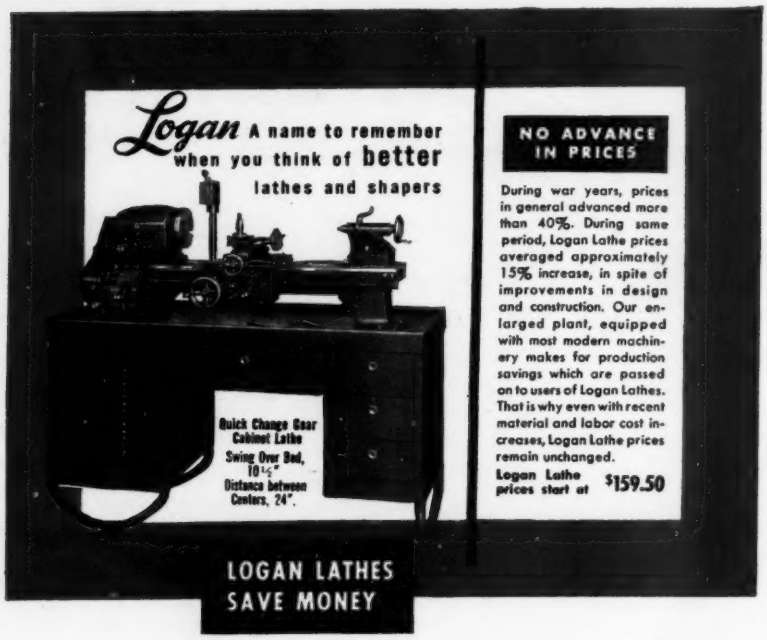
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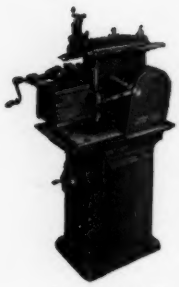

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(Continued from page 30A)

This is a revised edition brought up to date so as to conform to recommendations of the National Council of Teachers of Mathematics.

Grain Crops

By Harold Kirby Wilson. Cloth, 384 pp., 6¼ by 9¼ in., illus., $1.80. The McGraw-Hill Book Co., Inc., New York City.

This is an introductory text on the main grain crops raised in the United States.

The book consists of 23 chapters, which treat the subject under the following titles: grain crops and environment, plant classification, distribution of grain crops, crop rotation, the culture of grain crops, weeds, diseases of grain crops, insect pests of grain crops, wheat and rye, oats, barley, flax, rice, buckwheat, the millets, soybeans, corn growing, corn harvesting and storage, sweet corn, popcorn, sorghum, marketing of grain crops, and improvement of grain crops. There is also an index.

Young Folks at Home

By Florence LaGanke Harris and Treva E. Kauffman. Cloth, 444 pp., 6 by 9 in., illus., $2.60. D. C. Heath and Co., Boston, Mass.

A home-economics text for the junior high school student in which the activities and problems which a girl can enter into at school and at home are outlined and discussed.

The book contains many suggestions on how to do cleaning, cooking, repairing, altering, rearranging; make hanging shelves, dressing tables, drawer and closet partitions, etc.; sew and mend, wash and iron, and cook.

Planning the making of purchases also is taken up.

Research in Industrial Arts Education

By John Louis Feirer. Paper, 73 pp., 6 by 9 in. Printed by the Western Michigan College Print Shop, Kalamazoo, Mich.

A bulletin based upon a thesis presented by the author to the faculty of the Graduate School of the University of Oklahoma for the degree of doctor of education.

Section I deals with the status of research leading to advanced degrees in industrial-arts education, and Section II presents a course of study in industrial-arts research.

News Notes

♦ In America, Past and Present, an annotated bibliography (80 pages, 75 cents, H. W. Wilson Co., New York 52, N. Y.), Eloise Rue and a class of teacher-librarians at the Chicago Teachers College, have provided a helpful, up-to-date key to historical novels, for the use of teachers, students, and librarians. Their aim has been to select books which describe the everyday life of the plain people, their struggles, hardships, ideals, and achievements.

♦ General Motors Institute, Chevrolet & Third Ave., Flint 2, Mich., central training agency for General Motors, has announced the continuation of its auto-mechanics teacher training program in two sections for the summer of 1948. The courses, for college and high school instructors of auto mechanics and service subjects, will run from June 21 to July 17 and from July 19 to August 14. Write to the registrar for further information.

♦ How apprentice training is conducted by Rand Avery-Gordon Taylor, Inc., one of the 13 lithograph companies participating in the area-wide apprenticeship program established in Boston and vicinity, is described in an article by Charles E. Mallet, manager, Offset Division of the company.

Copies of a reprint of this article may be obtained by writing to the Bureau of Apprenticeship, U. S. Department of Labor, Washington 25, D. C. When requesting copies, please mention the publication in which you saw this announcement.

♦ A workshop in vocational and educational guidance, designed to give trained and experienced counselors a chance to work together on professional problems, will be offered at Teachers College, Columbia University, New York 27, N. Y., during the summer session, beginning July 6. The six-week conference will be divided into five seminars of one to two weeks each. Students, who must have the equivalent of a master's degree in guidance and experience in their field, may register for the whole workshop, a single unit or any combination of units. In order to assure a class of prepared participants, application must be made by May 15 for approval by June 1.

♦ The Virginia High School, Virginia, Minn., conducted a vocational clinic on February 18 at which local professional and businessmen assisted as clinicians. Twenty-four areas of vocational interest had been indicated by the high school students in a previous registration. The local Rotary Club assumed the responsibility of providing the speakers.

The hourly period was divided into a formal presentation by the speaker chosen for a given group. The presentation was then followed by a discussion and question period.

So well was the new venture received that the clinic will be made an annual affair.

♦ A new 10-reel sound motion picture on "Atomic Physics," distributed in 16mm., is an authoritative film that traces 140 years of history and development of our knowledge and use of atomic energy from the theory first proposed in 1808 by John Dalton. It is available for purchase

(Continued on page 34A)

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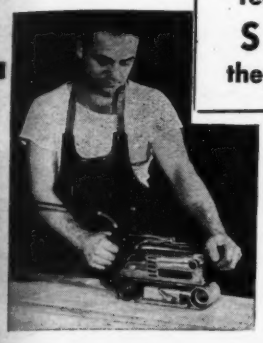

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Every Feature of Model A-3 Take-About Gives More for Your Money

Faster **— Has pulley speed of 200 r.p.m., delivers 1500 s.f.p.m. per minute!**

Powerful **— The ¼ H.P. motor does not over-heat. Lasts longer because the cooling air intake is high up on the machine to prevent inhalation of damaging dust.**

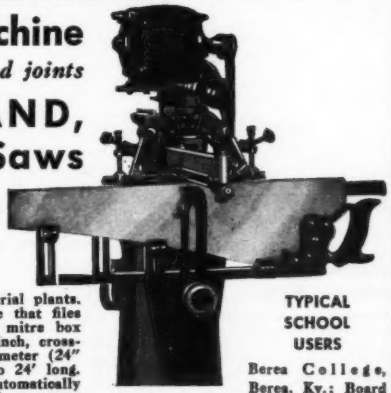
Easier to use **— The fast-acting TRIGGER SWITCH is in the handle for finger-tip control. Belt does not dig into the softest woods. Machine does not twist the wrist. Weighs only 14 lbs.**

WRITE TODAY for complete free details about labor-saving TAKE-ABOUT Sanders

PORTER-CABLE MACHINE CO.
1702-5 N. SALINA STREET SYRACUSE, N. Y.

SAW FILING

This ONE Machine
automatically files and joints
HAND, BAND, CIRCULAR Saws



The Foley Saw Filer is ideal for sharpening saws used by students in school shops. It keeps them in tip-top shape, faster and better than by hand filing. Used by Army, Navy, hundreds of manual training departments and industrial plants. The Foley is the only machine that files and joints all hand, back and mitre box saws from 3 to 16 points per inch, cross-cut circular saws up to 16" diameter (24" optional), and band saws up to 24' long. Patented jointing principle automatically evens up large and small teeth, so saws cut faster, truer, cleaner — stay sharp longer. Foley filed saws have less breakage and last longer.

30-DAY TRIAL OFFER

You may have the privilege of using the Foley Saw Filer in your own shop for 30 days. Write or send coupon for details.

TYPICAL SCHOOL USERS

Berea College, Berea, Ky.; Board of Education, Cleveland, Ohio; Boys Technical H. S., Milwaukee, Wis.; Charleroi School District, Charleroi, Pa.; Redlands Public Schools, Redlands, Calif.; Stout Institute, Menomonie, Wis.

FOLEY *Automatic* SAW FILER

FOLEY MFG. CO., 3318 N.E. 5th St., Minneapolis 18, Minn.
Please send full information on Foley Saw Filer and details 30-Day Trial Offer.

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Address.....
School.....

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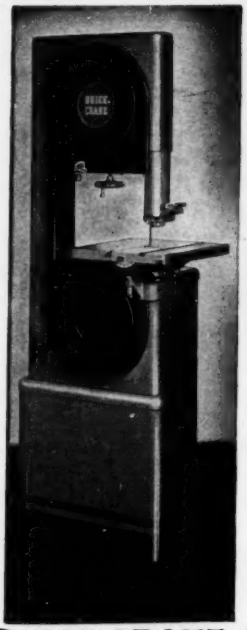


Designed for Ready Adaptability to a Wide Range of Projects

Fewer Boice-Crane Power Tools are needed to fill all your requirements. Of just the right size for school shops, you can plan more efficient layouts than with larger equipment.

As nearly 100% safe as modern devices can make them. Of durable construction, they can "take a beating" which would incapacitate most machines.

BOICE-CRANE SERIES NO. 2300 14" BAND SAW

Operates at higher speed — 4,400 blade feet per minute. Smoother and faster cutting. Sturdy enough for foundries and production. Accuracy to spare for tool and die work, like contour sawed cams, dies, and punches; ideal for experimental laboratories and pattern shops.

Single and 8-speed back-geared models for cutting practically any material. Clears 8⅝" under the guide.

One-piece welded steel frame has tremendous strength. Wheels and blade, except at cutting point, are entirely enclosed. Cabinet type base has sealed-off motor compartment. High safety rating.

Blade guides adjust by a single control, and with full safety, even when machine is running.

Close balance and light, but strong Textolite wheels permit twice the speed of other 14" machines. Less vibration, and longer bearing life. Saws wood two to four times faster. Often pays for itself in 3 to 6 months.

SPECIFICATIONS:

Sawing Capacity: Blade to guard — 13½" 27" dia. work. Guide to work table — 8⅝".
15" x 15½" Table: Tilts on Double Trunnions.
Height Overall of Floor Model: 67".
Blade Widths: 3/16", ¼", ⅜", ½" and ¾".
Length of Blade: 98".
Wheels: Disc. Textolite, 14" dia. 1" face.
Bearings: Grease-sealed Ball Bearings.
Blade-speed at 1200 r.p.m.: 4,400 ft per min.

FOR A GUARANTEE OF SATISFACTORY SERVICE specify only the products of manufacturers who SPECIALIZE in producing power tools rather than making them a sideline.

Write for free literature.

BOICE-CRANE COMPANY

932 CENTRAL AVENUE, TOLEDO 6, OHIO

Drill Presses • Jig Saws • Lathes • Jointers • Belt Sanders • Spindle Sanders • Spindle Shapers • Band Saws • Saw Jointers • Thickness Planers

(Continued from page 32A)

or rental through United World Films, Inc., 445 Park Ave., New York 22, N. Y.

♦ Twenty-four members of the faculty of the Milwaukee Vocational School, Milwaukee, Wis., are graduates of The Stout Institute, Menomonie, Wis.

♦ The second industrial-arts awards program and fair will again be held this year. It is open to all junior and senior high school students taking industrial arts.

Any student in grades 7 to 12 inclusive, enrolled in shop or drawing courses in a public, private, or parochial school in the United States, is eligible. In order to keep competition fair and equal, projects must be submitted in one of the following groups:

Group I — students in grades 7, 8, and 9, whether in an elementary, junior, or general four-year high school.

Group II — students in grades 10, 11, and 12, who receive instruction for less than 10 clock hours per week in industrial arts.

Group III — students in special courses in grades 10, 11, and 12, who receive 10 or more clock hours per week of instruction in industrial arts.

For additional information write to: George H. Fern, Director, Scholastic Industrial Arts Award, 220 E. 42nd Street, New York, 17, N. Y.

♦ A six weeks' course in photography for teachers in secondary schools will be offered by the Department of Photographic Technology of the Rochester Institute of Technology beginning July 12, 1948. The course will require 30 hours weekly and includes (1) theory of photographic processes, (2) teaching methods in photography, and (3) lectures on practical photography with work in the studio and laboratory. Applications close May 15. For particulars write to Department of Photographic Technology, Rochester Institute of Technology, Rochester 8, N. Y.

♦ The Lakeside Press played host on February 17 to a Flying Classroom, consisting of administrators from schools in various states, on an air tour to visit leading industrial plants for the purpose of bridging the gap between business and industry and education. The tour was made

School administrators of various states visit the Lakeside Press at Chicago

by approximately 120 school administrators, and was divided into four groups, each to visit several basic industries in Detroit, Chicago, and New York. Group three, which visited the Donnelley plants, was under the direction of Joseph Smidl of the Tuley High School, Chicago.

The visitors were conducted through the plant to acquaint them with the major printing processes in wide commercial use. They moved from the composing room to the bindery, observing many operations in the printing of books, magazines, pamphlets, catalogs, telephone directories, and encyclopedias.

♦ The bound volume of Occupational Index for 1947 is now available at $6.50 per copy from Occupational Index, Inc., New York University, New York 3, N. Y.

The volume contains more than 450 annotated references on almost 600 different occupations. Among the interesting kinds of work listed in the Subject Index are Agricultural Missionary, Cowboy, Nut Farmer, and Resort Sampler.

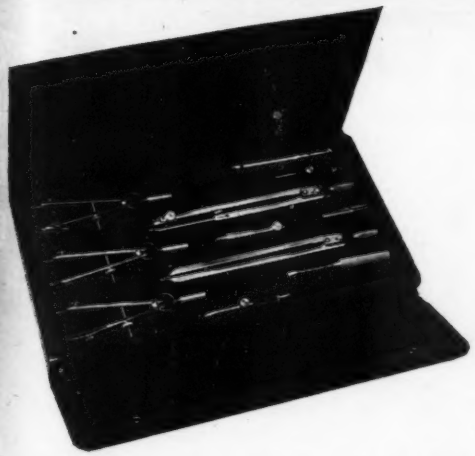
♦ A new, 1948 catalog of technical books has just been issued by The Chemical Publishing Co., Inc., 26 Court Street, Brooklyn 2, N. Y. This catalog includes the latest books on chemistry, physics, science, technology, petroleum, medicine, foods, formularies drugs and cosmetics, engineering metals, technical dictionaries, building construction, etc. A copy of this catalog will be sent free to those who request one.

♦ National Boys and Girls Week will be observed throughout the United States and Canada from April 24 to May 1, 1948. The celebration will mark the 28th annual observance of this important youth event.

With the theme, "Youth — Key to the Future," the program is designed to focus the attention of the public on the interests, activities, and problems of youth. It calls attention to the organizations and programs serving their needs, and seeks to arouse the interest of the entire community in supporting measures to strengthen and insure the wholesome, purposeful development of all boys and girls.

Suggested daily programs for the week include:
Citizenship Day — Saturday, April 24
Day in Church — Sunday, April 25
Day in Schools — Monday, April 26
Family Day — Tuesday, April 27
United Nations Day — Wednesday, April 28
Careers Day — Thursday, April 29
Day of Recognition — Friday, April 30
Health and Recreation Day — Saturday, May 1

Information about Boys and Girls Week, and helpful suggestions for carrying out the program of the week, including a poster and a Manual of Suggestions, may be obtained free of charge from National Boys and Girls Week Committee, 35 E. Wacker Drive — Room 950, Chicago 1, Ill.



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Weldwood Glue . . . the professionals' glue...helps busy teachers do a faster, better job of turning today's students into tomorrow's craftsmen.

Fast, because this modern, plastic bonding agent mixes quickly and easily with cold tap water. No mess. No waste. It spreads smoothly and sets within a few hours after clamping.

Pupils learn to do a *better* job because joints made with Weldwood Glue are stronger than the wood itself. Heat, moisture and rot can not affect them.

Your job is easier . . . and your pupils learn faster and better . . . when you teach with Weldwood Glue.

Weldwood Glue is available in a variety of sizes and prices at your school supply house, hardware store or lumber yard. For full information and sample, mail the coupon.

Teach the boys today with the glue they'll use tomorrow

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Available in DC and AC rectifier-type panel instruments for most requirements. Dependable and accurate—ideal for all-around laboratory use. Angle-type mounting bases available.

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Miniature DC portables, with knife-edge pointers and mirror scales to eliminate parallax and afford full advantage of the accuracy of the instrument.

MODEL 430

An extensive group of portables, for general testing and all-around use. Large rectangular opening permits easy reading of mirror scale.

Weston's complete family of instruments and testing equipment fills the bill for every school laboratory need. For further information, write Weston Electrical Instrument Corporation, 595 Frelinghuysen Avenue, Newark 5, New Jersey.

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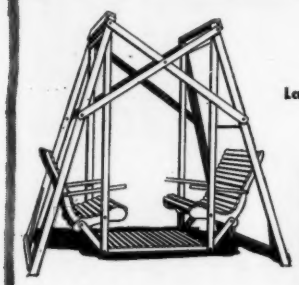
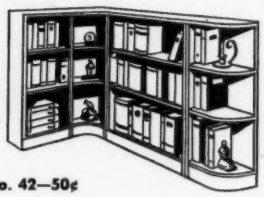


Lawn Glider, No. 155—50¢



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EASI-BILD* Full-Size Patterns attack "fear complex"!

Now you can eliminate the "fear complex" most students get when they tackle their first project.

These new *full-size* patterns build self-confidence by making project-building easy—simply trace pattern on wood; saw and assemble. And the completion of the first project makes the boys want to build others. Almost 100 projects available.

Every Easi-Bild Pattern contains a complete list of needed materials and assembly illustrations—shows where each nail, screw or bolt is used, tells which one of these CASCO glues to use for the job.

Cascamite for indoor projects—furniture, toys, cabinets.

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Cascorez for models, paper projects or where "fast set" is important.

See for yourself. Send coupon below for either or both of the 2 popular patterns shown above . . . also description of complete pattern service and Casco Gluing Chart. See how Easi-Bild simplifies woodworking.

CASCO Pattern Dept. IV-58, P. O. Box 215, Pleasantville, N. Y.
Enclosed is_____for patterns checked below.
☐ Lawn Glider, No. 155—50¢ . . . ☐ Bookcase, No. 42—50¢

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School_____
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City_____Zone_____State_____

THE BORDEN COMPANY • CHEMICAL DIVISION
Makers of Casco Glues

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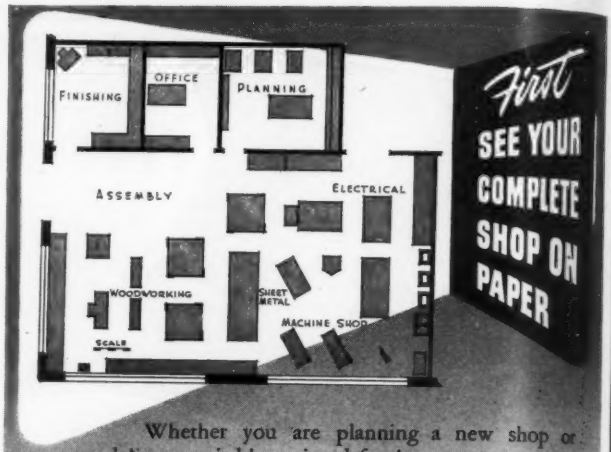

Whether you are planning a new shop or remodeling, see it blue-printed first!

Sheldon engineers have years of experience in industrial arts and vocational shop planning. They are always ready to serve you . . . working closely with you to achieve the most economical and efficient set up.

Call on your Sheldon engineer—give him the basic information—and without cost to you he will plan your shop specifically to your school requirements.

World's Largest Exclusive Manufacturers of Laboratory and Vocational Furniture

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It's Complete
It's the Latest
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May we have the privilege of quoting on your next years requirements?

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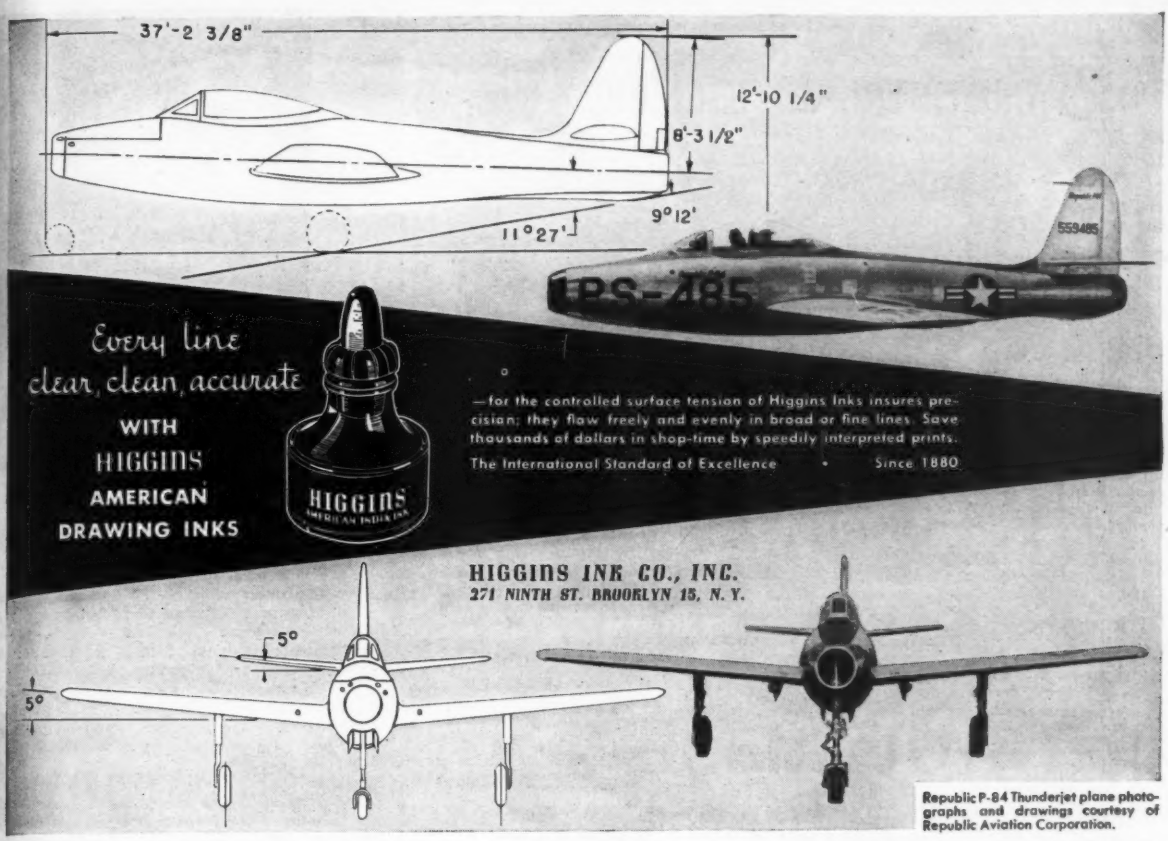
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Republic P-84 Thunderjet plane photographs and drawings courtesy of Republic Aviation Corporation.

Shop Equipment News

NEW PRODUCTS — PUBLICATIONS

NEW CINCINNATI NO. 2 CUTTER AND TOOL GRINDER

The new No. 2 Cutter and Tool Grinder, built by The Cincinnati Milling Machine Co., Cincinnati 9, Ohio, offers increased convenience of operation and less routine service attention.

The grinding wheel spindle bearings are the preloaded precision antifriction type, packed in grease for lifetime lubrication. The dual hand table traverse knobs, traditionally located at the rear of the machine, are now duplicated at the front, so that the operator has table traverse controls close to hand at every possible operating position.

Vertical adjustment of the grinding wheel head has been increased to a total of 10½ in.

Electrical controls are built in, at the front of the machine. A disconnect switch, operated by the latch handle on the electrical compartment door, shuts off the current when the door is opened. Additional safety will be found in the transformer unit included with the controls for shops operating on high voltages. It reduces the voltage to 110 at the built-in push buttons. They consist of start and stop buttons for plain and universal machine; in addition, universal machines are equipped with a two-way switch for the cylindrical grinding attachment motor.

A wide variety of attachments are available for these machines. A ¾ h.p. motor, mounted on the lower end of the wheelhead column, drives the grinding wheel spindle through the medium of an endless flat belt. To exclude dust, the wheelhead column is encased by an accordion-type rubber guard.

New Cincinnati tool grinder

Additional information may be obtained by writing for catalog M–1618.

For brief reference use IAVE—0501.

NEW STANLEY ROUTER AND SHAPER CATALOG

Catalog No. 80 on Stanley Carter Equipment for woodworking and plastic industries, has recently been published by Stanley Electric Tools, Division of the Stanley Works, New Britain, Conn.

This catalog gives a clear explanation of how various portable and stationary routers, shapers, grinders, power planes, etc., can be used for veining flat or curved work; inlaying; beading and fluting; carving; surfacing meat blocks; and sash and door fitting and weatherstrip grooving.

The catalog also gives information about the various types of cutters, chuck adapters, spacer collars, high-speed rotary files, arbors and spindles, and grinding wheels produced by this firm.

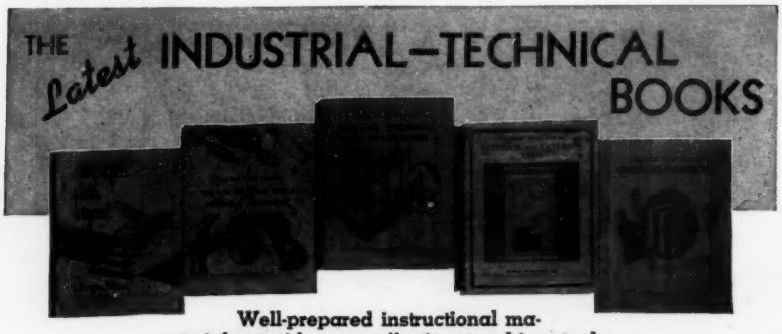
For brief reference use IAVE—0502.

AIRCO ANNOUNCES NEW ELECTRODE

The new Airco No. 387 all position arc welding electrode for welding of mild steel was developed to fill a definite need by industry for an electrode possessing the following specific characteristics:

1. The bead is smooth and of proper contour.
2. Excellent operating characteristics are obtained on a.c. or d.c.
3. A minimum of spatter is produced when used on either a.c. or d.c.
4. Operates most satisfactorily in all positions; especially when welding vertically down.
5. A high degree of welding performance is maintained throughout the entire length of the electrode when high welding currents are used.
6. Exceptionally easy slag removal.

(Continued on page 38A)



Well-prepared instructional material provides an effective teaching tool for training in schools, industry and the home.

Delmar Publications emphasize an effective **NEW** approach to the teaching-learning process through the development of instructional units which correlate basic related technical information (Why-to-do) with fundamental processes. Committees of experts from schools, industry and supervisory fields develop each new book.

Delmar Publications are widely used in the United States and Canada in apprentice training, day and evening private and public trade and technical schools, technical institutes—and are adaptable to industrial arts programs. The instructional units in each book may readily be adapted to an existing course of study because of complete coverage of subject or topic within each unit, clarity of presentation, and the correlation made possible with a **unit pattern.**

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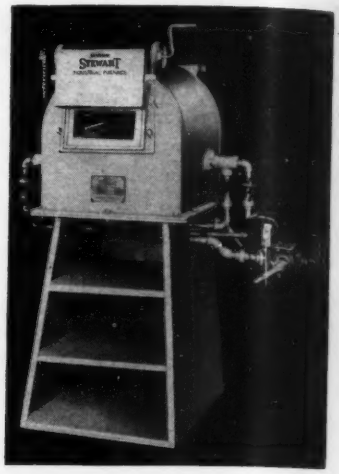


New Sunbeam-Stewart furnace

and general heat-treating. The extreme flexibility of this Sunbeam-Stewart semimuffle oven furnace makes it ideal for general toolroom use.

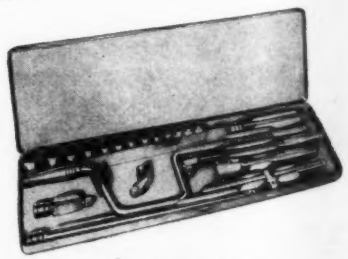
The outer shell of the furnace is constructed of steel and cast iron to eliminate the possibility of warpage at high temperatures. A patented "seal-tite" door maintains a constant seal between door and furnace proper.

This new Sunbeam-Stewart is available in the following sizes: 4 by 8 by 12 in.; 6 by 12 by 18 in.; and 9 by 15 by 24 in. heating space.

For brief reference use IAVE—0505.

THE NEW SNAP-ON FERRET SET

Snap-on Tools corporation of Kenosha, Wis., announces the introduction of a streamlined and completely redesigned ⅜-in. drive line of sockets and handles known as the new Snap-on Ferret Set.



New wrench set

The Palm-Grip handle, built to conform to the shape of the user's hand, is but one of the features of the new set. Four sockets have been added which give the set size coverage between ¼ in. and ⅞ in.

Newly designed sockets will have four indentations on the inside of the socket drive hole to make the engaging of the ball found in the handle of the driving unit an easy job.

Finished in full chrome, highly polished, the new Snap-on Ferret Set is marketed in a streamlined box with rounded corners and extra deep partitions.

For brief reference use IAVE—0506.

TWO STUDY FEATURES

For shop and classroom Behr-Manning Corp., Division of Norton Co., Troy, N. Y., offers two important and most timely study features.

1. A lecture supplement on the selection and application of coated abrasives for metalworking. This is put out in response to hundreds of requests from instructors of metalworking. It is a companion to the original lecture course on coated abrasives and the woodworking supple-

(Continued on page 44A)

(Continued from page 37A)

7. More inches of weld per electrode than most E–6012 class electrodes.

This new electrode is available in 1/8-, 5/32-, 3/16-, and ¼-in. diameters.

For further information on the new Airco No. 387 electrode write Air Reduction Sales Company, Dept. 1815P, 60 East 42nd Street, New York 17, N. Y., or the Airco sales office nearest you.

For brief reference use IAVE—0503.

NEW STENCIL CUSHION SHEET

A. B. Dick Co., 720 W. Jackson Blvd., Chicago 6, Ill., manufacturers of Mimeograph brand products, are now supplying a new type of cushion sheet known as Mimeograph "Type-White" for use with the Mimeotype (blue) stencil sheet.

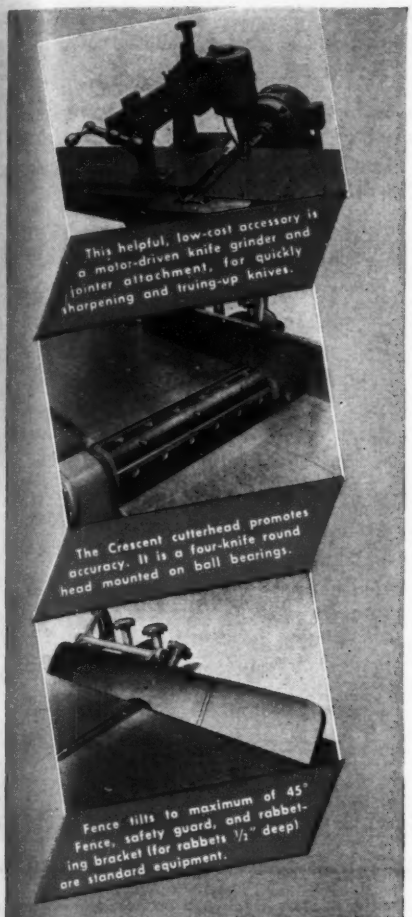
This new cushion sheet offers customers high visibility when typing and does not interfere with stencilization. Copies produced from a stencil using the Type-White cushion sheet are clear and easy to read, with sharp letter outlines.

For brief reference use IAVE—0504.

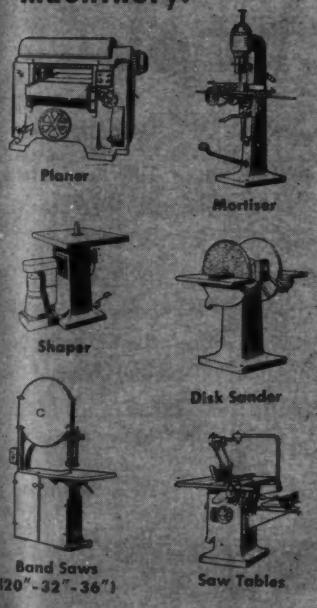
TEMPERATURES FROM 300 to 2400 DEG. F. AVAILABLE IN NEW FURNACE

A small semimuffled gas-fired oven furnace with a temperature range of 300 to 2400 deg. F. (and any intermediate temperature) has been designed by Sunbeam-Stewart Industrial Furnace Division of Sunbeam Corp., 5600 Roosevelt Rd., Chicago 50, Ill. New type burners permit a 95 per cent turndown range of fuel. The uniformity at low temperatures is obtained by increasing air over gas ratio, thus heating by convection.

The temperature range of 300 to 2400 deg. F. enables this new oven furnace to be used for a wide variety of work such as annealing, carburizing, hardening, preheating, tempering,


This helpful, low-cost accessory is a motor-driven knife grinder and jointer attachment, for quickly sharpening and truing-up knives.
The Crescent cutterhead promotes accuracy. It is a four-knife round head mounted on ball bearings.
Fence tilts to maximum of 45°. Fence, safety guard, and rabbeting bracket (for rabbets ½" deep) are standard equipment.

CRESCENT builds a complete line of woodworking machinery:



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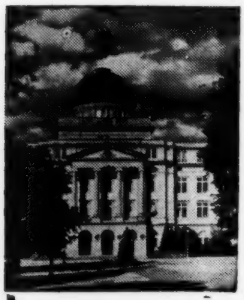

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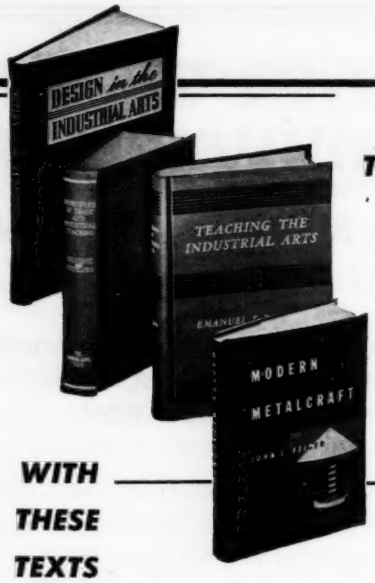

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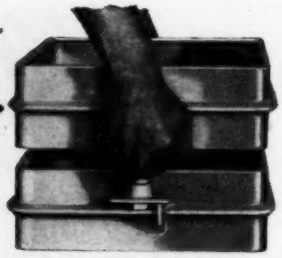

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(Continued from page 38A)

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For brief reference use IAVE—0507.

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